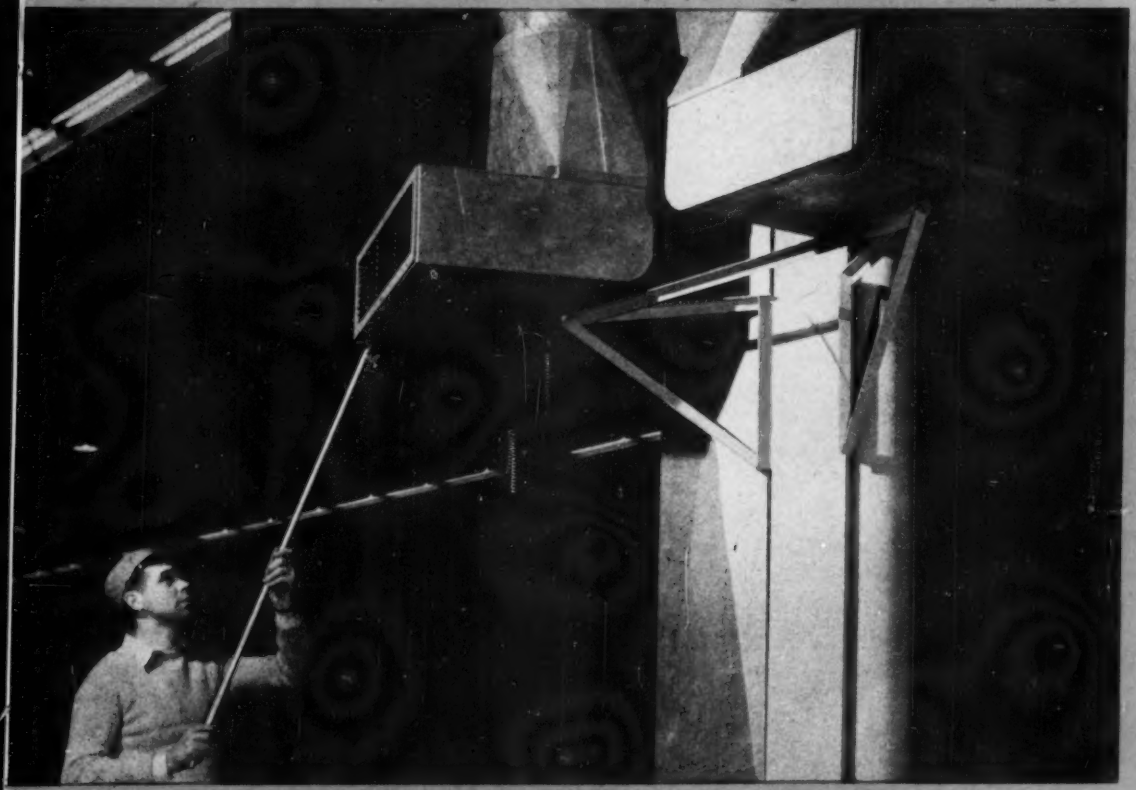
Heating Piping & Air Conditioning

DESIGN
INSTALLATION
OPERATION
MAINTENANCE

NOVEMBER ★ 1952

INDUSTRIAL
COMMERCIAL
INSTITUTIONAL AND
PUBLIC BUILDINGS

Page 111—Journal Section of The American Society of Heating and Ventilating Engineers



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AIR DISTRIBUTION FOR AN "EGG-CRATE" CEILING 77

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fig. 195, max. load: 1500 lb.
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fig. 199, max. load: 3000 lb.

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fig. 202
load: 150 to 2300 lb.

Side Column Bracket
fig. 203
load: 150 to 390 lb.

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fig. 223
load: 610 lb.

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fig. 221
with angle iron ext.
fig. 222

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fig. 168
½ to 3 IPS

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fig. 126
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fig. 154
for ⅜ to ⅞ in. rod

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fig. 153
for ⅜ to ⅞ in. rod

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fig. 128
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Adj. Clip Base
fig. 116
for ¾ to 2 in. pipe
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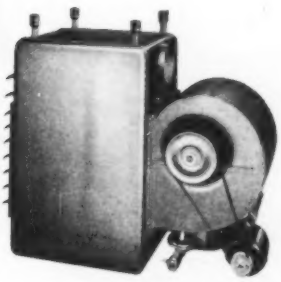

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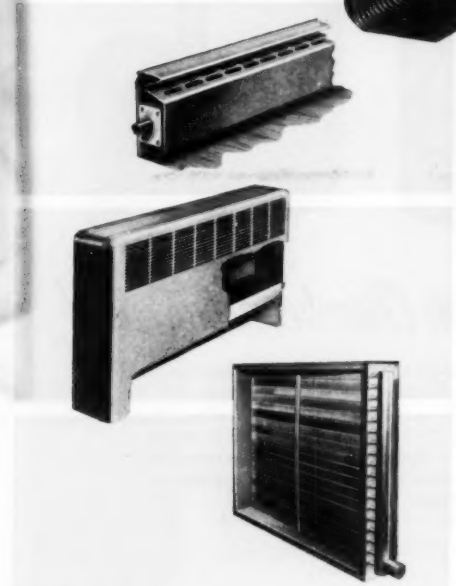

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Heating Piping & Air Conditioning

Vol. 24 No. 11

NOVEMBER 1952

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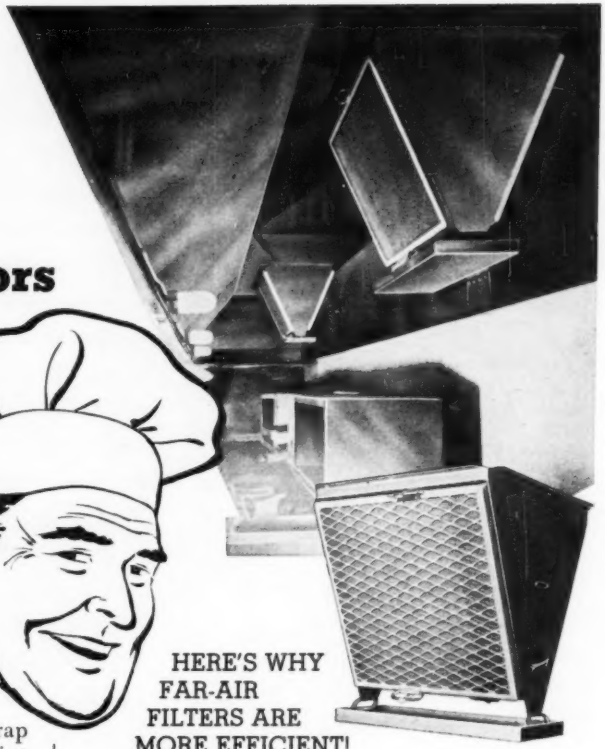

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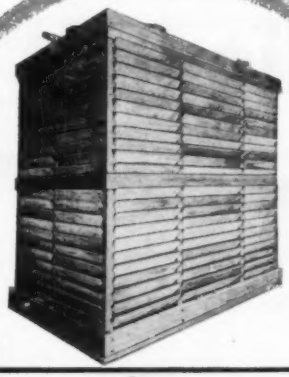
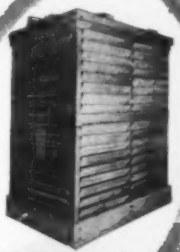
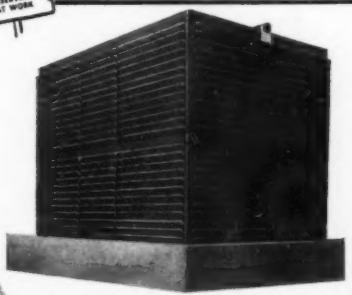


Typical SR10 Model. All Lumber in COTOSPRAY® Towers is selected All Heart Redwood.



Typical SR8 model. All SR8 and SR10 models include steel basin.

WATER CONSERVATION AT WORK



Typical SR12 Model. Note simple bolted assembly with louvers that lift out for easy access to interior.

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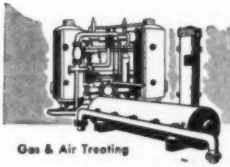

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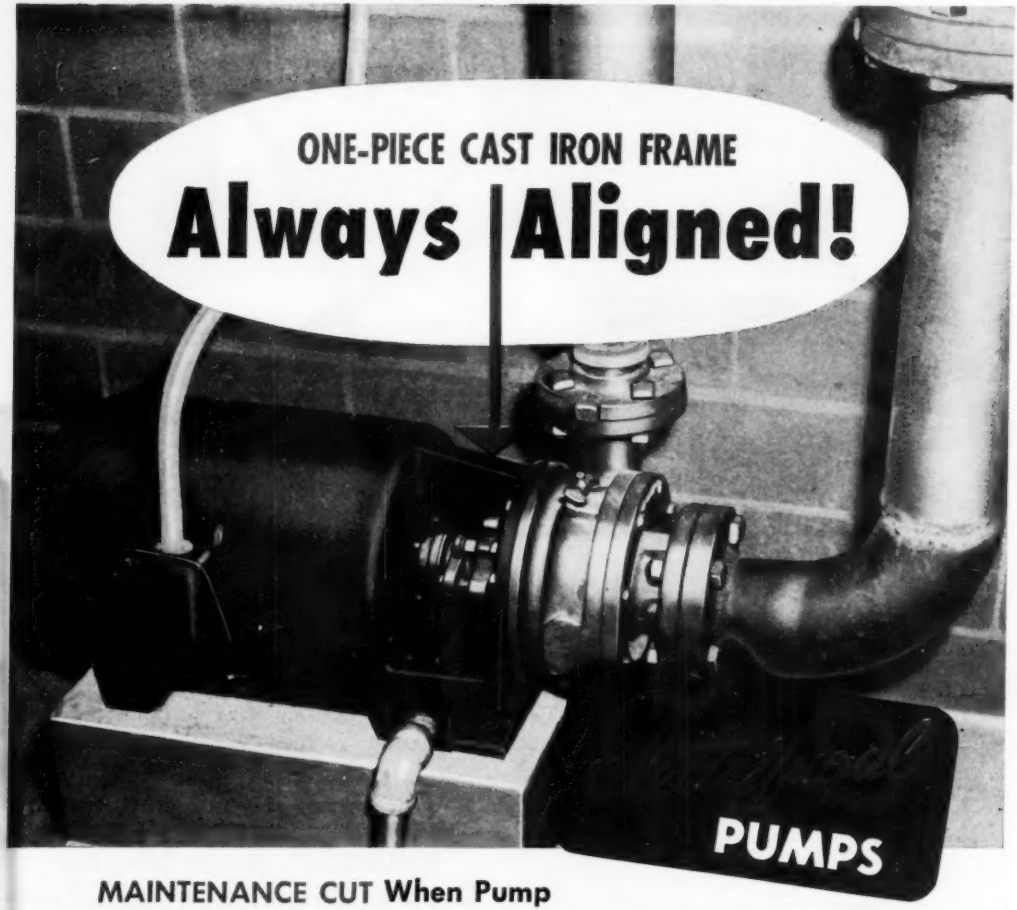

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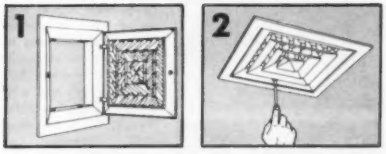

Insert diffuser "slip hinges" into frame slots

Turn mounting lock 90° with screw driver

Today: AGITAIR Type RC with four way core provides correct air distribution from center of room.

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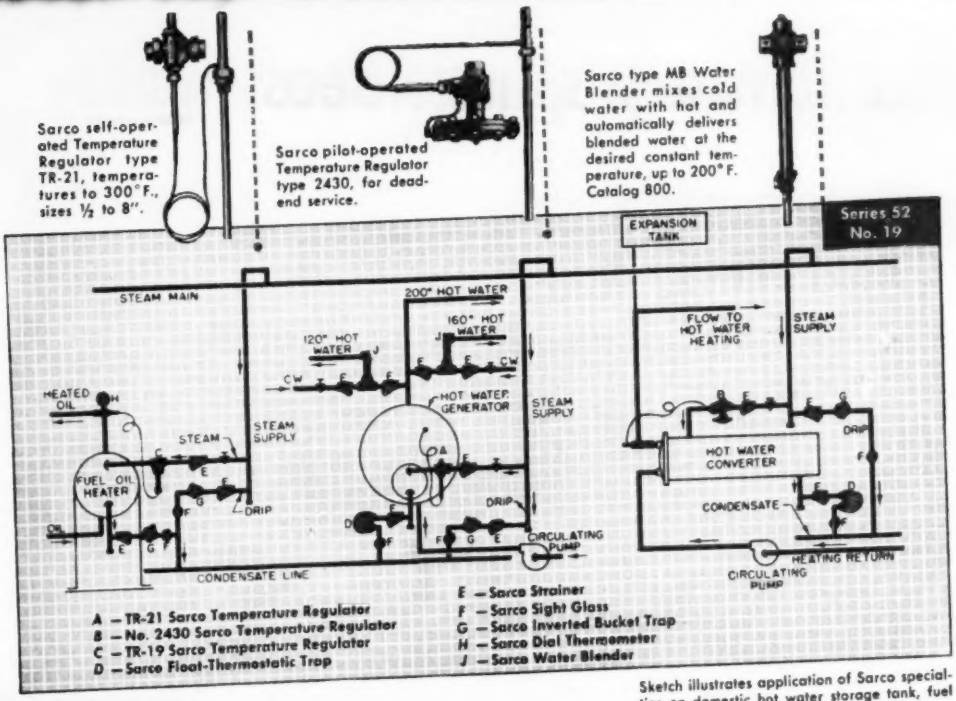
Sarco self-operated Temperature Regulator type TR-21, temperatures to 300°F., sizes ½ to 8".
Sarco pilot-operated Temperature Regulator type 2430, for dead-end service.
Sarco type MB Water Blender mixes cold water with hot and automatically delivers blended water at the desired constant temperature, up to 200°F. Catalog 800.
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CONDENSATE
HEATING RETURN
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C — TR-19 Sarco Temperature Regulator
D — Sarco Float-Thermostatic Trap
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J — Sarco Water Blender

Sketch illustrates application of Sarco specialties on domestic hot water storage tank, fuel oil heater and converter for space heating.

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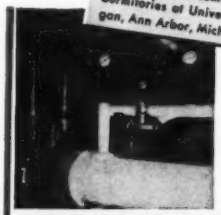
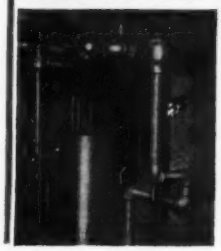
SARCO saves steam

a sarco temperature control for every job

Sarco type TR-21 self-operated temperature regulators on service water storage tanks from twin heaters as installed some years ago in dormitories at University of Michigan, Ann Arbor, Michigan.



Sarco type 2430 temperature regulator on instantaneous water heater supplying water at various constant temperatures to experimental extruding machines at Western Electric Company's vast wire and cable plant at Point Breeze, Md. In use since 1948.



2½" Sarco Water Blender type MB as installed some years ago in the dormitories of University of Michigan to reduce washroom and shower water temperatures from 180°F., to a constant 120°F.

405

For *Steam* Heating, too, it's **Sarcotherm**!

Effective control of steam heating systems for single or multiple buildings is best accomplished by continuously modulated flow of steam, proportioned automatically by outdoor temperature.

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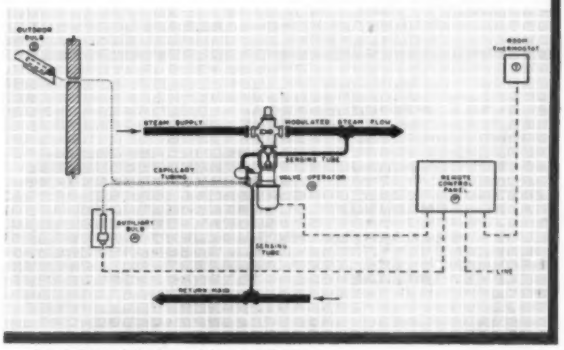


Fig. 1, Typical Hook-up of Sarcostat System.

Fig. 3, Type W Manual remote Control Panel is equipped with temperature adjusting knob for "warmer" and "cooler," also a four-position Selector Switch for "Automatic," "Full Heat," "Heat Off," and "Summer."

Fig. 4, Type WSA Remote Program Control Panel, adds to the features of type W a time clock to provide automatic morning pickup and night setback, and other features as specified.

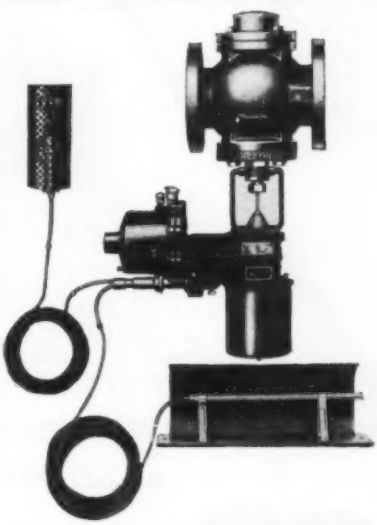
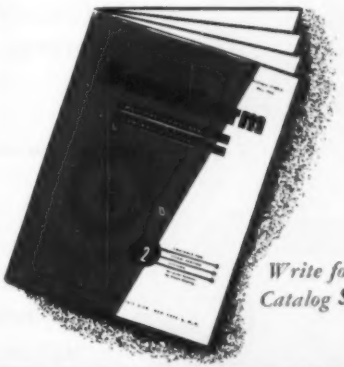


Fig. 2, Sarcostat Modulating Control Valve, Type W-1.



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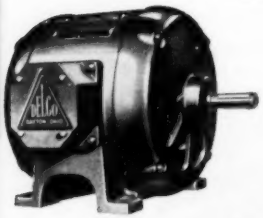
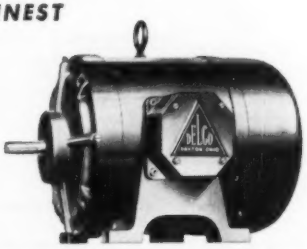
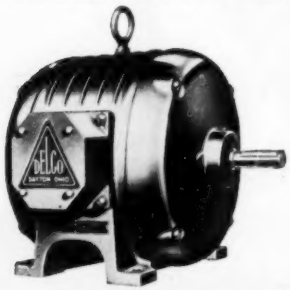


OPEN BALL-BEARING MOTOR

TOTALLY ENCLOSED FAN-COOLED MOTOR

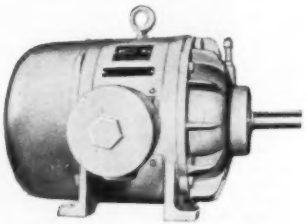


DELCO
DAYTON OHIO



TOTALLY ENCLOSED MOTOR

EXPLOSION-PROOF MOTOR



DELCO PRODUCTS

SALES OFFICES: ATLANTA • CHICAGO • CINCINNATI • CLEVELAND • DALLAS
DETROIT • HARTFORD • PHILADELPHIA • ST. LOUIS • SAN FRANCISCO

DIVISION OF GENERAL MOTORS CORPORATION, DAYTON, OHIO

Discussing Heating Problems Lately?

Problems like instant heat? Eliminating the initial cold blast of air? Maintenance and fuel economy?

These and most other heating problems are solved the day an Olson Heater is installed . . . and stay solved for many years to come.

Yes, Olson unit or central warm air heaters are manufactured by heating engineers with the "know-how" of many years in the heating industry.

It is well worth while to investigate the advantages of an Olson Heater before any final decisions are made.

If your problem calls for a long lifed heater—
then you need an Olson heater.

ARTHUR A. OLSON & COMPANY
BROAD ST. CANFIELD, OHIO

Write for complete information and engineering data.

these steam traps won't freeze up!

Freeze-ups of outdoor steam traps in winter weather often cause production delays. Don't take that chance . . . especially when it's so easy to install Yarways, the steam traps that *won't freeze up.*

They won't freeze because condensate does not accumulate. The only moving part—a little valve—is continually testing for condensate, discharging it as soon as it forms. There's never anything to freeze.

Other reasons why over 750,000 Yarway Impulse Steam Traps have been sold—they get equipment hotter, sooner; light weight; small size; easy to install and maintain; good for all pressures; made of stainless steel.

More than 200 industrial distributors sell Yarway Traps and Strainers. See your nearest one today. For name, and free 24-page Steam Trap Book, write . . .

YARNALL-WARING COMPANY
107 Mermaid Ave., Philadelphia 18, Pa.

YARWAY

the steam trap designed with more production in mind

UNEQUALED for CONTROL of GAS HEATING

White-Rodgers controls offer simplicity of installation . . . ease of adjustment . . . long dependable performance . . . standardization of design . . . and numerous other benefits that make them highly desirable to both makers and users of gas heating equipment.

Every needed type . . . valves, pilots, thermostats, Hydraulic-Action controls for hot water or warm air . . . hooked-up in a simple 2-wire circuit to efficiently and safely give you the most possible comfort from gas heating.

Write today for complete catalog and installation information

WHITE-RODGERS

WR Controls FOR REFRIGERATION HEATING AND AIR CONDITIONING

ST. LOUIS 6, MO.

Branches: New York, N. Y.—Long Island City 1, 35-14 Crescent St.
Chicago 11, Ill.—548 N. Lakeshore Dr.
Cleveland 3, Ohio—5005 Euclid Ave.
Detroit 21, Mich.—16590 Wyoming Ave.

Resident Sales Engineers in all Principal Cities

Announcing the most rugged TRANE gas unit heater ever built!

Now! A Heater Built Like a Boiler!

Heavier gauge steel throughout! Bigger, more powerful motor! New *steel* fan designed especially for unit heater application! Welded seams all around. Durable "Bonderized" finish.

Even the joints in the heat exchanger have come in for special treatment. TRANE has *eliminated* troublesome gaskets, furnace cement and other joining materials by using beaded and flanged connections to give you trouble-free joints as permanent as steel itself.

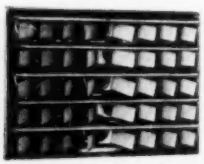
Features like these and other carefully engineered, exclusive details make it possible for you to hang gas heating from the ceiling more efficiently, more economically than ever before.

Have all the facts on hand when you plan your next gas unit heating job. Get the new TRANE Gas Unit Heater Bulletin just off the press. Write TRANE, La Crosse, Wisconsin, for the name of the TRANE Gas Unit Heater Distributor in your area.

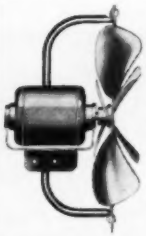
These features mean extra years of trouble-free, thrifty operation

Rugged Construction—Heavier gauge metal throughout means extra safety, extra years of service.

Built Like a Boiler—No gaskets, no furnace cement. Beaded and flanged connections throughout.



Heat Where You Want It—Extra control of heat placement with patented TRANE Louver Fin Diffuser.



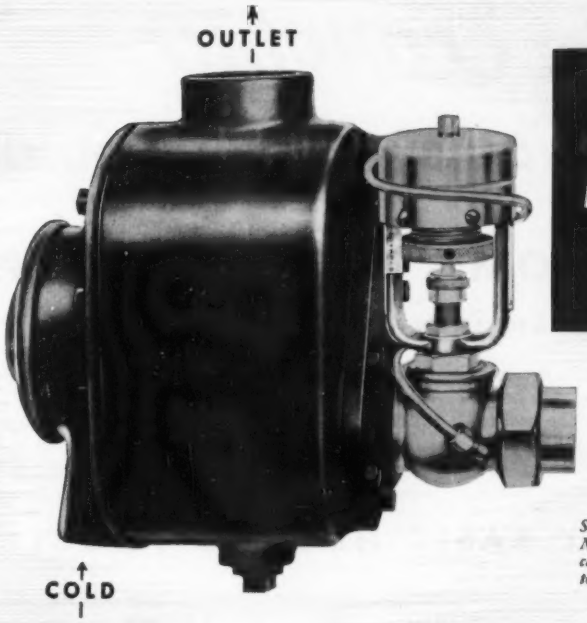
Special Trane Fan—Engineered specifically for unit heaters. Wide blade doesn't *chop* air. It pushes—quietly!

Approved by A.G.A.—Official tests prove this new unit not only complies with A.G.A. standards, but actually *surpasses* their national safety requirements.

TRANE

THE TRANE COMPANY, LA CROSSE, WIS.
Eastern Mfg. Division, Scranton, Pa.
Trane Company of Canada, Ltd., Toronto
Offices in 80 U.S. and 14 Canadian Cities

MANUFACTURING ENGINEERS OF HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT



AUTOMATIC MIXER TAMES HOT WATER

Sylphon Hot-Cold Water Mixer No. 902. Sizes with capacities ranging from 5 to 131 gallons per minute.

...just right for showers and baths!

THIS SYLPHON Hot-Cold Water Mixer can "take over" the job of supplying constant temperature hot water—relieve you of all worries! It's one of the best helps you can have for gang showers . . . wash basins . . . fountains . . . needle showers . . . continuous baths. And it can also be used to supply process water in many industries.

See how simply and dependably this Sylphon Mixer works. It uses hot water from any storage tank or instantaneous heater. It regulates the amount of cold water required to temper it to the desired degree. It actually mixes water together before delivery. And even if the supply water temperature or pressure fluctuates—temperature remains constant.

And think of this extra advantage! If either hot or cold water supply fails, the Sylphon Mixer immediately shuts off the remaining supply. When supply is returned, the Mixer starts operating again.

Sylphon Hot-Cold Water Mixers are self-contained, self-powered, compact and ruggedly built. Serve economically for years. Adjustable temperature range. For complete information, write Dept. VH.

FIRST WITH BELLOWS

Temperature Controls • Bellows Devices • Bellows Assemblies

FULTON SYLPHON
DIVISION

ROBERTSHAW-FULTON CONTROLS CO. KNOXVILLE 4, TENN.

Canadian Representatives, Darling Brothers, Montreal

Look for Economy
WHEN YOU BUY HEATING PUMPS

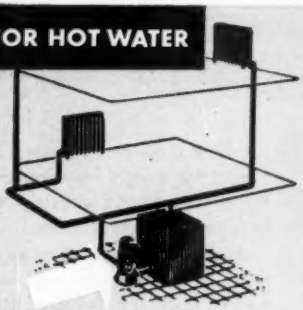
WHEELER-ECONOMY HEATING PUMPS
with Better-Than-Ever Engineering and Quality Control

With the consolidation of Economy Pumps, Inc. and C. H. Wheeler Manufacturing Company, the heating pumps you have always bought as "the best in the field" will now be sold as WHEELER-ECONOMY HEATING PUMPS. Representatives are being appointed in key areas to give you good service with a time-honored line of heating pumps that is now *better than ever.*

The Wheeler-Economy line of heating pumps has undergone a complete engineering check-up and re-analysis from the castings out. Many refinements have been made and a new face-lifting has been effected . . .

TYPES FOR EVERY BASIC HEATING PROBLEM

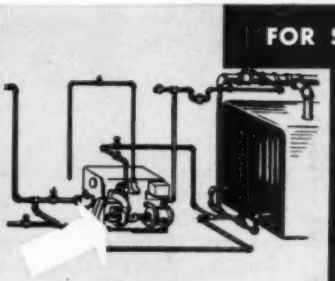
FOR HOT WATER



HOT WATER CIRCULATION

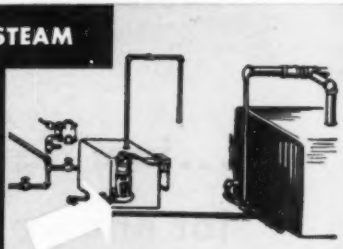
Wheeler-Economy Circulating Pumps deliver hot water to radiators quickly and return warm water to boiler with high efficiency.

FOR STEAM



STEAM VACUUM

The Wheeler-Economy Vacuum Pumps employ the most efficient design ever devised for removing air and water from condensate return lines.



RETURN CONDENSATION

Wheeler-Economy Condensation Pumps give outstanding performance in a compact dependable design.

WHEELER-ECONOMY HOT WATER CIRCULATING PUMPS

Type SCV—Vertical direct connected centrifugal pump. Sizes 1″ to 3″. Capacities to 500 GPM. Various RPM speeds 1150 to 3450. Heads to 225′.

Type SCC—Close coupled vertical or horizontal mounted. Sizes 1½″ and 2″. Capacities to 100 GPM. 3450 RPM. Heads to 120′.

TYPE SCV

TYPE SCC

WHEELER-ECONOMY VACUUM PUMPS

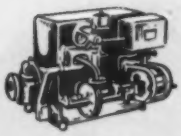
Type VV—Vertical Vacuum Pumps—Suitable for use on all ordinary jobs operating between 3 and 12 inches of vacuum. Made for all discharge pressures up to 150 lb. per sq.in. Capacity sq.ft. E.D.R. 2500 to 15,000. Single and duplex units.

Special Capacities—VVS and VVSD single and duplex units recommended wherever capacity of system or air leakage is greater than ordinary. Also where lifts or pockets in the returns necessitate carrying higher vacuum. (Example: 10 to 16 inches.)

Type SVA—Horizontal Vacuum Pumps—For ordinary jobs operating between 3 and 12 inches of vacuum. Discharge pressures up to 150 lb. per sq.in. Capacity sq.ft. E.D.R. 20,000 to 100,000. Single and duplex units.

Special Capacities—Styles SVS single unit and DVS Duplex Unit, recommended where air capacity or air leakage in the system is greater than ordinary. Also where lifts or pockets in return require the carrying of higher vacuum—example 10 to 16 inches.

TYPE VV



TYPE SVA

WHEELER-ECONOMY RETURN CONDENSATION PUMPS

Type E—Operate at 1750 RPM or for 50 cycle current at 1440 RPM. The best pump where extremely quiet operation is desired. Single and duplex units. Capacity sq.ft. direct C.I. radiation or equivalent: 1000 to 65,000.

Type EC—Available for the same or higher pressure than handled by Type E pumps. Operate at 3450 RPM. Units for 50 cycle current operate at 2880 RPM. Capacity sq.ft. direct C.I. radiation or equivalent 1000 to 65,000. Single and duplex units.

Vertical Underground Pump—Used where returns are below floor level or otherwise too low for horizontal pumps. Cast Iron tank can be installed flush with floor. No pit required for pump. Low and medium pressure units equipped with single stage pumps of vertical design. For higher pressure units a multistage pump of special design is used. Capacity in sq.ft. direct C.I. radiation or equivalent 2000 to 50,000. Single and duplex units.

Type S—Condensation Pump with Steel Receiver—An "Economy" installation where service is not severe and heavy construction cast iron tanks are not required. Where steel receiver is satisfactory and low cost is of primary importance Type S is recommended. However, these low cost models are the equal of the top grade in many competitive lines. Single or duplex units.

Type MR—Lightweight Pump for low pressure steam heating systems. Priced to meet competition . . . with no compromise in workmanship and materials. Capacities up to 65,000 sq.ft. E.D.R. Single and Duplex Units.

Types B and C—Horizontal Return Condensation Pumps—Type B multi-stage pump for pressures up to 150 lbs. 1750 RPM. Quiet operation. Capacities in sq.ft. direct C.I. radiation equivalent to 6000 to 65,000.

Type C multi-stage pump for pressures up to 175 lbs. 3600 RPM 60 cycle. Identical to type B except for higher speed operation. Capacities in sq.ft. direct C.I. radiation equivalent to 6000 to 65,000.

Type G—Horizontal Return Condensation Pump—Type G single suction, single stage designed for medium and high pressures at motor speeds 1800 to 3450 RPM. Receivers of all three types, "B", "C" and "G" are welded steel plate unless otherwise ordered.

All Wheeler-Economy Heating Pumps are tested before shipment and guaranteed for workmanship and materials.

TYPES E & EC

TYPE U

TYPE S

TYPE MR

TYPES B & C

TYPE G

SOME TERRITORIES STILL AVAILABLE FOR REPRESENTATIVES WHO QUALIFY

Over 15 million dollars' worth of these pumps are in use throughout the United States

126

WHEELER-ECONOMY PUMPS

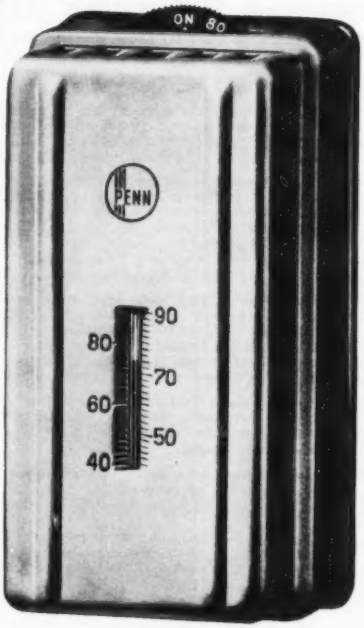
ECONOMY PUMPS INC. DIVISION OF C. H. WHEELER MANUFACTURING CO.
19TH AND LEHIGH PHILADELPHIA 32 PA

selective heating

summer ventilation

fuel economy

3 jobs with 1 UNIT HEATER CONTROL



First, you get selective heating to meet the particular requirements of various sections of a building. Once set, the operation is automatic. Then, heat anticipation holds temperature closely to the selected level for real heating comfort.

Second, during winter months the "ON-OFF" switch is a great fuel saver. A mere rotation of the dial to "OFF" position stops heat flow during idle periods . . . or to little-used areas . . . or to areas where heat can escape such as receiving or shipping rooms which may be exposed to outside temperatures for long periods.

Third, during the summer, this *same* switch permits manual control of unit heater fan for ventilation whenever desired. For continuous fan operation, you merely rotate the dial to "ON" position.

Yes . . . these 3 jobs are possible with *one* PENN Unit Heater Thermostat featuring heat-anticipation PLUS the built-in "ON-OFF" switch! Learn more about this *better control* for unit heaters. Ask your manufacturer, wholesaler or write **Penn Controls, Inc., Goshen, Indiana.** Export Division: 13 E. 40th Street, New York 16, N. Y., U. S. A. In Canada: Penn Controls Limited, Toronto, Ontario.

PENN

AUTOMATIC CONTROLS

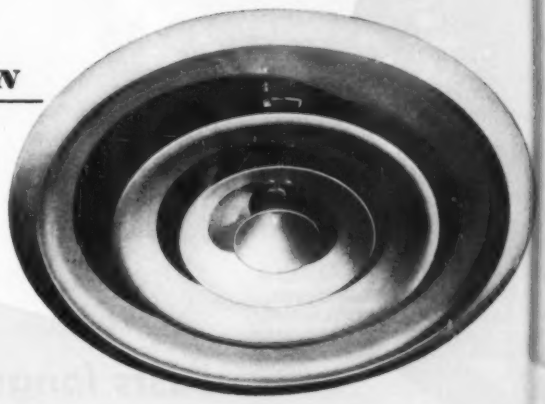
FOR HEATING, REFRIGERATION, AIR CONDITIONING, PUMPS, AIR COMPRESSORS, ENGINES, GAS RANGES

Recipe for comfort

1 CONTROLLED TEMPERATURES

2 CONTROLLED HUMIDITY

3 DRAFTLESS AIR DISTRIBUTION



Air conditioning calls for *three* ingredients: controlled temperatures, controlled humidity *and* draftless air distribution. Anemostat air diffusers provide the finishing touch of comfort by distributing a uniform, slow-moving blanket of air that reaches every corner of the room.

Architects, engineers and contractors know that Anemostat air diffusers blend perfectly into the recipe for *comfortable* air conditioning. That's why more Anemostat air diffusers are in use than any other make.

ANEMOSTAT®

DRAFTLESS *Aspirating* AIR DIFFUSERS

ANEMOSTAT CORPORATION OF AMERICA

10 EAST 39th STREET, NEW YORK 16, N. Y.

REPRESENTATIVES IN PRINCIPAL CITIES

"No Air Conditioning System Is Better Than Its Air Distribution"

AC 1250

ALOYCO No. 111-A gate valve for 150 pounds service is made in a wide range of analyses to specification and regularly stocked in popular alloys.

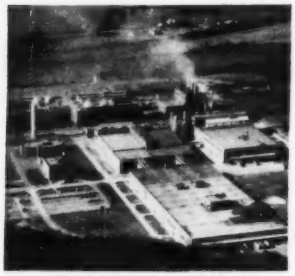
Lasts longer in corrosive service

This bolted bonnet type gate valve, made to specification, provides the three basic advantages of all ALOYCO valves . . . (1) special engineering for severe corrosive service through (2) extensive metallurgical research and (3) production of high alloy valves exclusively.

Celanese efficiently handles hot and cold acids with ALOYCO valves

THE CORROSIVES: Cold, hot and boiling vapor glacial acetic acid; cold mixtures of glacial acetic acid and acetic anhydride; cold, weak (30%) mixtures of acetic acid.

THE APPLICATION: Manufacture of cellulose acetate flake (raw material for many plastics) from purified cellulose in combination with acetic anhydride and acetic acid, with sulfuric acid as catalyst. (Cellulose acetate flake dissolved in acetone is extruded into filament yarn and staple fiber for textiles.)



This Celanese plant enjoys lower valve cost and longer valve life with ALOYCO valves.

THE PLACE: Celanese Corporation of America, Celco plant, Narrows, Va.

THE VALVES: ALOYCO 18-8SMo No. 111-A gate valves.

THE RESULTS: Former acid-resistant bronze valves with stainless steel trim proved unsatisfactory on cold acid mixtures. On the other hand, the original ALOYCO valves, installed when the plant opened in 1940, are still operating perfectly with only minor maintenance.

THE BACKGROUND: No other valve maker has such extensive facilities for meeting corrosive conditions with the right alloy and the right valve.

ALOYCO is the *largest specialist* in corrosion-resistant valves, applies them to solve successfully problems of corrosion, contamination, discoloration, temperature extremes, proper application.

If you have a problem of this nature, address it to ALOYCO's corrosion engineers for a profitable solution.

ALLOY STEEL PRODUCTS CO., INC.
1322 West Elizabeth Avenue, Linden, N. J.

Longer Lasting

ALOYCO VALVES

1st in Corrosive Service

A Highly Efficient Blanket Insulation

. . . for effective control of temperature and sound

If you have a heating, refrigerating or air conditioning application that calls for an insulation with the most effective thermal-acoustical qualities, you might well ask these questions about Microlite Glass Fiber Insulating Wool:

Is it easy to apply? . . . *24 square feet of half-inch, half-pound Microlite weighs a mere 8 ounces. Large sections can be quickly and easily applied, like a downy blanket. Knife or shears are the only necessary cutting tools.*

Is it permanent? . . . *Microlite is made of glass fibers that resist fire, corrosion, moisture and vibration settling. It does not decay and provides no nutriment for fungi or vermin.*

Does it insulate well? . . . *Inch for inch, Microlite is one of the most efficient of all insulations. 1 lb. density material has a "k" factor of .21 at 75° F. mean temperature.*

Are convenient sizes and types available? . . . *It comes to you in resilient blankets up to 72 inches wide, up to 200 feet long, and up to 3 inches thick; compressed in easily-stored rolls. It may be ordered with foil, reflective coated paper and reinforced or unreinforced paper vapor barriers.*

Perhaps Microlite can help you cut installation costs and achieve a lighter finished application. For more information and samples, write Glass Fibers Inc., 1810 Madison Avenue, Toledo 2, Ohio.

A Vitron® GLASS FIBER PRODUCT

Sales Offices and Distributors in Principal Cities

GLASS FIBERS INC.

Makers of glass fibers by the **ELECTRONIC-EXTRUSION** process . . . developed, patented and used exclusively by Glass Fibers Inc.

Who said only cucumbers are cool?

More and more of the country's foremost frozen food producers depend on Worthington refrigeration for the fast freezing which insures that fresh-picked flavor.

And more and more food outlets of every size protect produce . . . keep customers contented regardless of the weather . . . with Worthington air conditioning.

For any job—large or small—when you specify "Worthington" for air conditioning or refrigeration you specify the equipment your client links with the "first" names in every field.

No other manufacturer makes *so complete* a line. A Worthington system is all Worthington-*made*... not just Worthington-assembled . . . assuring perfectly balanced operation and unit responsibility.

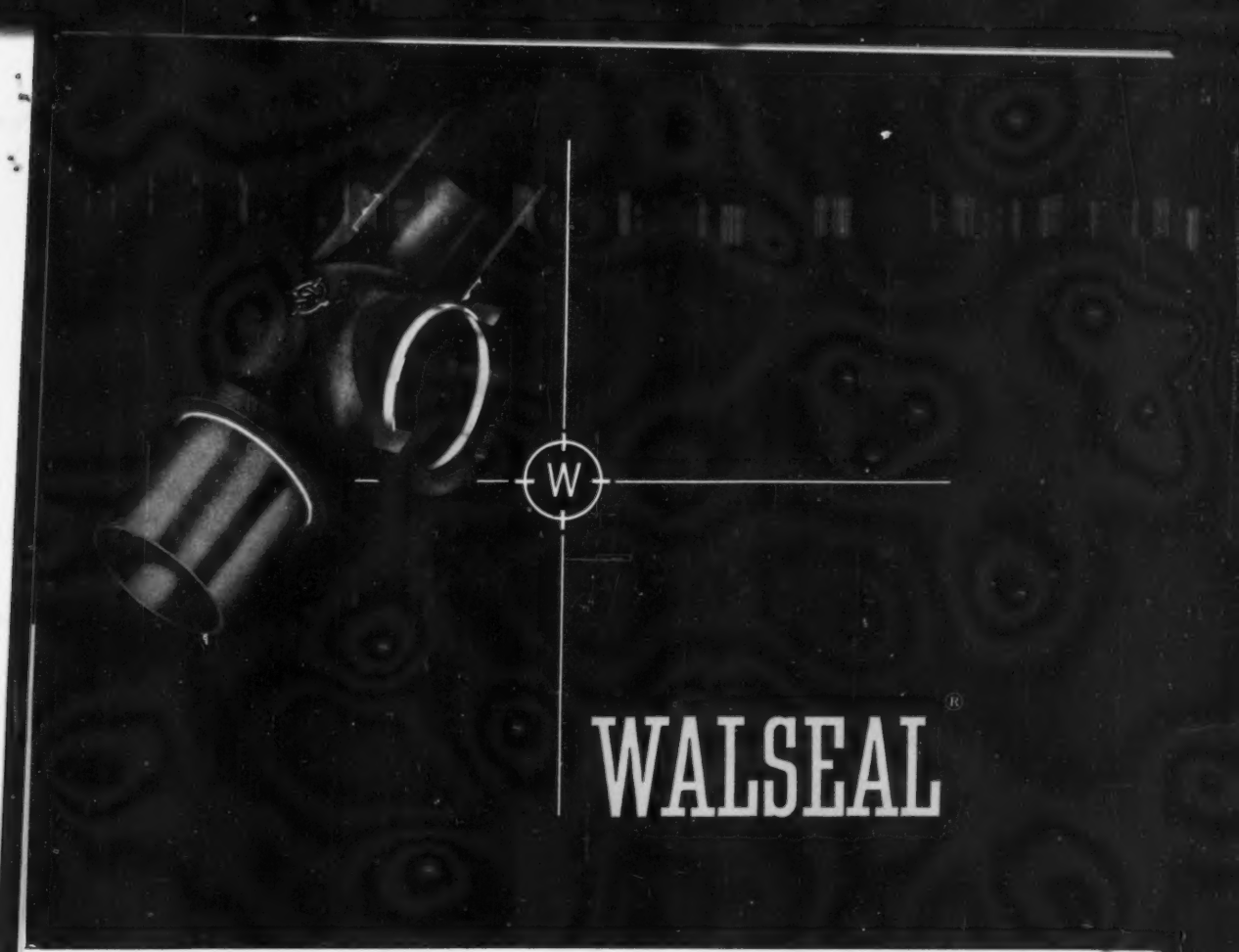
Worthington Corporation, Air Conditioning and Refrigeration Division, Harrison, New Jersey.

A-2.10

America's Leaders... in Many Businesses... Select

WORTHINGTON

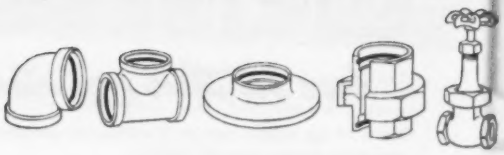
AIR CONDITIONING AND REFRIGERATION



COMPLETE LINES OF WALSEAL VALVES AND FITTINGS
Bronze valves and pipe fittings manufactured by Walworth having *factory-inserted* rings of silver brazing alloy in the port openings in lieu of pipe threads, are called "Walseal"— a registered trade-mark of the Walworth Company.

Walseal valves and fittings are manufactured in a variety of types and sizes for making silver brazed joints in copper and copper-alloy piping. Working pressures range up to 5000 psi.

Complete lines of Walseal valves, fittings, flanges, and unions are included in the approximately 50,000 items made by the Walworth Company, valve manufacturers since 1842.



The sectioned Walseal tee illustrated, shows: the fillet of alloy that appears upon completion of the joint; the *factory-inserted* ring of silver brazing alloy; and sectioned view of completed Walseal joint. Walseal joints can be made only with Walseal valves or fittings. For further details regarding Walseal, write for Circular 84.

WALWORTH

Manufacturers since 1842

valves . . . fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

SEE OUR CATALOG IN SWEET'S

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

WeldELLS®

...have set their own standards

Many of the largest users of Welding fittings refuse to accept any other fittings than WeldELLS.

They have found that when the name, WeldELL, is stamped into a fitting, that fitting can be accepted without question for any service for which it is designed.

They have found that WeldELLS have features that please both the men who design and the men who erect welded piping . . . features that were pioneered by Taylor Forge . . . features that are combined in no other welding fittings.

They have found the answer to their every need in the greater range of sizes, weights and types of the WeldELL line . . . in the broader scope of materials.

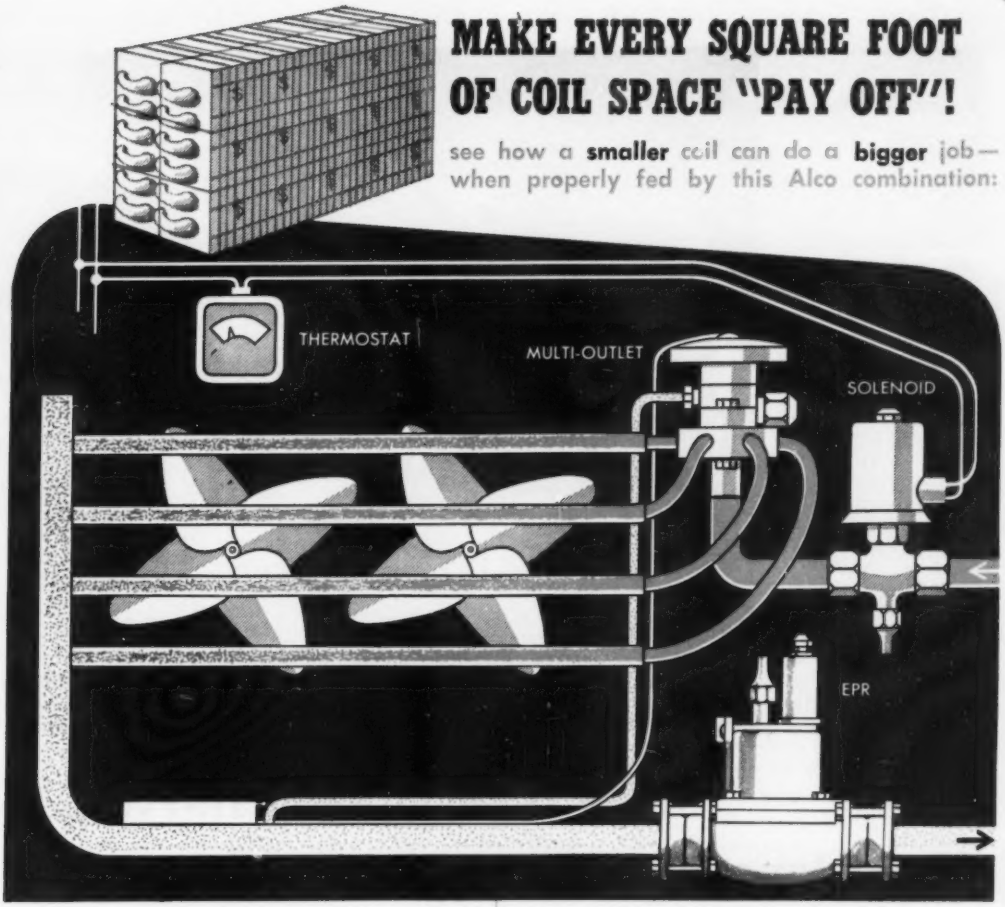
For up-to-the-minute facts
see your Taylor Forge Distributor

TAYLOR FORGE

TAYLOR FORGE & PIPE WORKS, General Offices and Works: P.O. Box 485, Chicago 90, Ill.
Offices in all principal cities. Plants at: Carnegie, Pa.; Fontana, Calif.; Hamilton, Ont., Canada

MAKE EVERY SQUARE FOOT OF COIL SPACE "PAY OFF"!

see how a **smaller** coil can do a **bigger** job—when properly fed by this Alco combination:



TYPE "TO" MULTI-OUTLET THERMO VALVE—**for *individual* liquid metering to each circuit. Assures you of equal distribution under high temperature, low temperature, high load, or low load conditions. Eliminates "hunting and cycling"—gives longer compressor life. Simple "come-apart" construction for easy cleaning and maintenance—without removing valve from line. Multi-Outlet valves available with from 2 to 36 outlets.**

M635 SOLENOID—**positive liquid stop, thermostatically controlled. Dependable, quiet operation—all internal parts made of stainless materials.**

EPR 15—**evaporator pressure regulator for product protection against de-humidification or "freeze-up". Maintains constant back pressure.**

FOR FURTHER DETAILS, SEE YOUR ALCO WHOLESALER —AND WRITE FOR CATALOG #19.

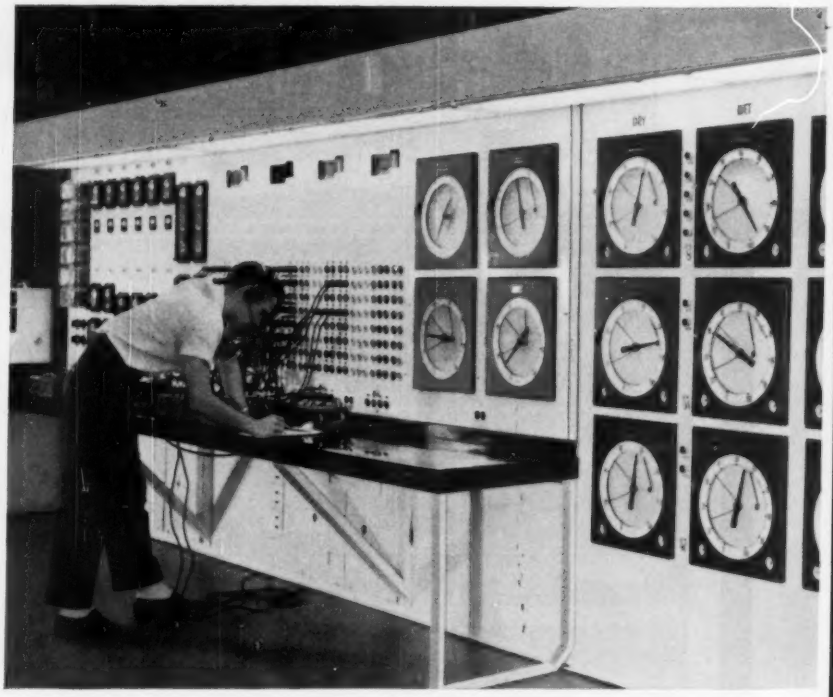
ALCO

Designers and Manufacturers of Thermostatic Expansion Valves; Evaporator Pressure Regulators; Solenoid Valves; Float Valves; Float Switches.

ALCO VALVE CO.

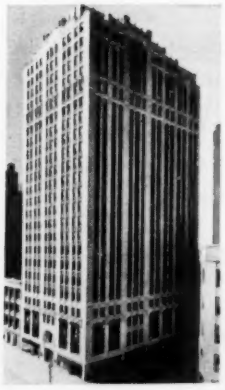
861 KINGSLAND AVE. • ST. LOUIS 5, MO.

4800



Indiana. Photo at right shows Honeywell Brown Instruments used for precision control in Harvester's six-room refrigeration experimental lab in the Evansville works. Instruments measure water temperature differential, control air conditioning temperature operations and humidity.

Why International Harvester Uses Honeywell Customized Temperature Control on a Nationwide Basis



Systems provide precision industrial control, help insure comfort and efficiency

If you were to take a handful of drawing pins and locate on a map all the U. S. plants and offices of International Harvester, you'd soon see how the company's facilities spread from the home office in Chicago (photo at left) to cover the entire country.

And anywhere you located a Harvester operation, chances are good that you'd pinpoint a Honeywell installation.

Because Harvester uses Honeywell Customized Temperature Control on a nationwide basis—for industrial control, and for comfort control. And with good reason.

Honeywell Customized Temperature Control is *flexible.* That means it can meet almost any industrial control problem you might name—from controlling humidity within two per cent to regulating the thickness of an oil film in terms of a thousandth of an inch.

In *comfort* applications, Honeywell Customized Temperature Control helps insure employee efficiency by providing superior indoor "climate."

And when it comes to *service,* there's always a "local Honeywell office" nearby to provide replacement parts, skilled maintenance men and control engineers to help with your planning. Because Honeywell maintains 96 offices in key cities across the nation.

Maryland. Throughout the Harvester organization, the contribution proper indoor "climate" makes to employee efficiency is well understood. Thus, in general office areas like the one above—in the company's Baltimore parts depot—you'll find Honeywell Customized Temperature Control in charge of comfort.

Oregon. Office areas in Harvester's Portland parts depot are scientifically zoned for comfort—according to occupancy, use and exposure. A sensitive Honeywell thermostat guards the comfort level in each zone. And in the warehouse area, separate controls for every unit heater are provided by the Honeywell Customized Temperature Control installation.

Iowa. Heating of warehouse areas in Harvester's Des Moines general sales and motor truck sales district office is economically controlled for maximum large-area comfort by Honeywell Customized Temperature Control. Location of unit heaters and their individual temperature controls was planned to meet occupancy, use and exposure factors.

For Comfortable, Even Temperature in New or Existing Buildings—of Any Size—Specify Honeywell Customized Temperature Control

Whether it's a factory, office, hospital, apartment, store, school, garage—or any size building—new or existing, Honeywell Customized Temperature Control can help meet your clients' heating, ventilating, air conditioning and industrial control problems.

Once equipped with Honeywell Customized Temperature Control, they'll have an ideal indoor "climate"—and save fuel besides.

And with a complete line of pneumatic, electric and electronic controls to choose from, Honeywell Customized Temperature Control offers you the greatest flexibility in design.

Then, too, when it comes to performance, Honeywell-built controls assure years of trouble-free operation. And they're backed by the finest service organization in the controls industry.

For full facts on Honeywell Customized Temperature Control, call your local Honeywell office. There are 96 across the nation. Or mail the coupon today.

MINNEAPOLIS
Honeywell

First in Controls

MINNEAPOLIS-HONEYWELL REGULATOR CO.
Dept. HA-11-232, Minneapolis 8, Minnesota
Gentlemen: I'm interested in learning more about Honeywell Customized Temperature Control.

Name _____

Firm Name _____

Address _____

City _____ *Zone* ____ *State* _____

FROM OUR FILE OF HEAT INSULATION JOBS

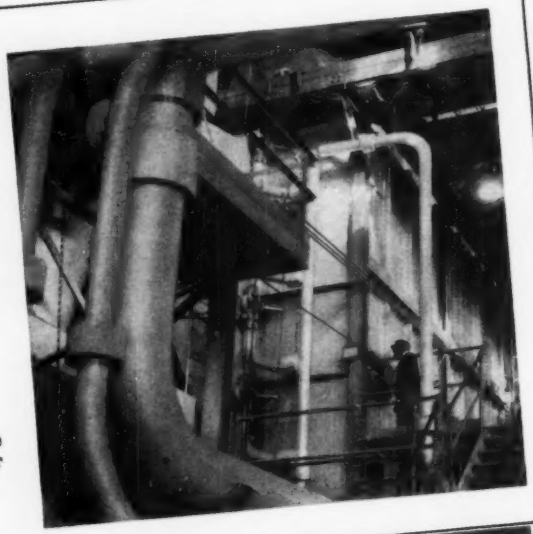
CONTRACT # 10523

COMPANY:
Lehigh Portland Cement Co.
Union Bridge, Md.

INSTALLATION:
Waste heat boiler

OPERATING TEMPERATURE:
Boiler supplies steam at 700° F. and 400 lbs. pressure to power plant turbine

REMARKS:
Insulation must minimize heat loss between boiler and turbine



Proper insulation helps plant extract all its power from "waste" heat

Energy remaining in the heat from their rotary kilns supplies the Lehigh Portland Cement Co. with enough power to operate their entire plant. The photo above shows part of the boiler installation used to transform "waste" heat into electric energy. This unit produces a continuous supply of steam at 700° F. and 400 lbs. pressure to a power plant turbine. The turbine generates enough electricity — about 75,000 KWH per day — to meet all the power requirements of the company's cement-making operations.

Here, insulation serves to minimize heat loss as the superheated steam is piped from boiler to turbine. The main steam header is insulated with a 1½" thick layer of 85% Magnesia Pipe Covering over a similar thickness of Armstrong's Hy-Temp Block. Two smaller boiler feed water lines (parallel to the main steam header in photo) are insulated with 1½"-thick Magnesia. Insulation on all three lines is finished with 8-oz. sewn canvas jackets, then coated with aluminum paint.

Armstrong offers you a full line of top-quality insulating materials, as well as a complete insulation contract service. We can take over the entire job for you—from specs to skilled application of materials by experienced workmen. You're assured of an efficient, trouble-free job. For further information, just contact your near-by Armstrong office or write Armstrong Cork Company, 4410 Maple Ave., Lancaster, Pa.

Complete Insulation Contract Service

A satisfactory insulation contract is more than a bid on a set of specifications. There are other factors that cannot be written into a proposal but which can largely determine whether or not the agreement will be entirely satisfactory. They include:

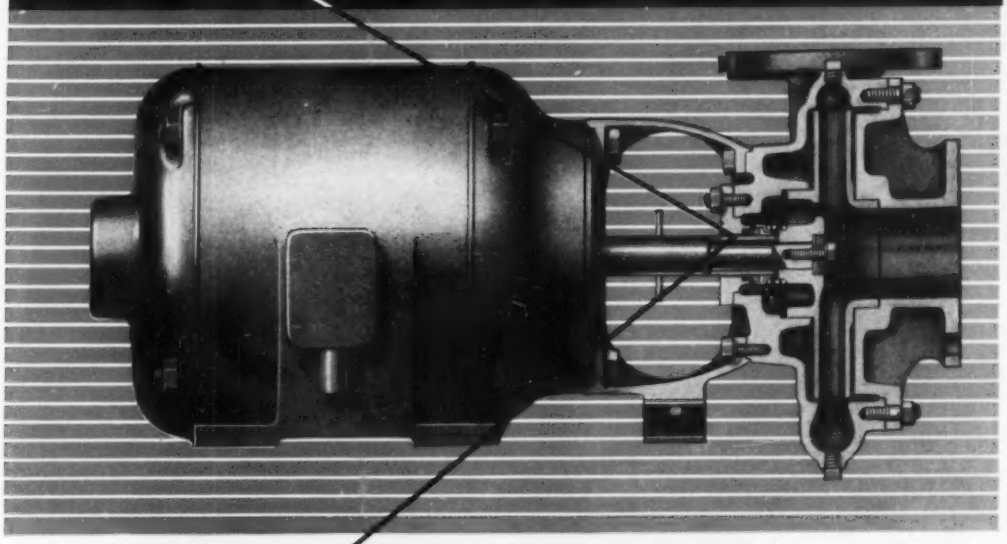
1. Financial responsibility — resources to complete the contract despite any unforeseen events.
2. Integrity—a reputation for quality work and for prompt settlement of any justified complaints.
3. Technical ability — experience plus technical and research staff to complete the work in accordance with best practices.
4. Manpower resources — trained supervisors and workmen able to handle any contract efficiently.
5. Efficiency—ability to handle accurately things like accounting, tax provisions, insurance, and workmen's compensation.

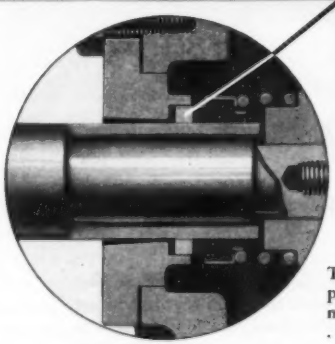
You get all these with an Armstrong Contract

ARMSTRONG'S INDUSTRIAL INSULATIONS

For temperatures up to 2800° F.

NEW *Remite* SEAL ENDS LEAKAGE TROUBLES





Cross-section showing Remite Mechanical Seal.

B&G *UNI-BUILT*

SERIES 1531 CENTRIFUGAL PUMP

. . . a better pump for air-conditioning and refrigeration installations

The "REMITE" Mechanical Seal of this pump presents a revolutionary new development in pump design . . . eliminates leakage . . . assures long, trouble-free life.

A carbon seal ring faces on a "REMITE" floating seat—a new type of material, *so hard it will scratch glass*—wear-proof and corrosion-resistant! This Seal is self-lubricating.

Note the pump shaft . . . super-finished high grade steel . . . oversized for minimum deflection . . . quiet. The impeller is of sound hydraulic design, mechanically balanced, with balance ring and relief holes to reduce thrust. The heavy duty ball-bearing motor is normally furnished as drip-proof, but is also available in splash-proof, totally enclosed and explosion-proof models.

B & G Series 1531 Uni-built Pumps are made with capacities to 1200 GPM, heads to 400 feet.

Send today for catalog No. ET-452, giving complete engineering data on the B & G Series 1531 Uni-built Centrifugal Pump.

BELL & GOSSETT
COMPANY
Dept. RC5-5, Morton Grove, Ill.

Canadian Licensee: S. A. Armstrong Ltd., 1400 O'Connor Drive, Toronto, Canada

The U. S. Steel Supply team that gives you *personalized service*

...*our salesman*

puts this team to work for you!

SUPPLYING YOUR STEEL requirements becomes our team objective when you tell your needs to your U. S. Steel Supply salesman. Behind your salesman is a team of technical experts, each one a specialist in his field . . . and your business receives the attention of every member of the team who can contribute to its progress.

What do you need? Steel? Tools? Special purpose equipment or machinery? Advice on working an unfamiliar type of steel? Help in meeting a pressing delivery date? Give your order to your U. S. Steel Supply salesman. He will see that it gets immediate attention from the U. S. Steel Supply specialists best qualified to serve you.

YOUR "ONE CALL" SOURCE OF STEEL SERVICE

U.S. STEEL SUPPLY

UNITED STATES STEEL SUPPLY DIVISION, UNITED STATES STEEL COMPANY
HEADQUARTERS: 208 So. LA SALLE ST., CHICAGO 4, ILL. WAREHOUSES COAST-TO-COAST

Warehouses and Sales Offices: BALTIMORE · BOSTON · CHICAGO · CLEVELAND · LOS ANGELES · MILWAUKEE · MOLINE, ILL. NEWARK · PITTSBURGH · PORTLAND, ORE. · ST. LOUIS · TWIN CITY (ST. PAUL) · SAN FRANCISCO · SEATTLE

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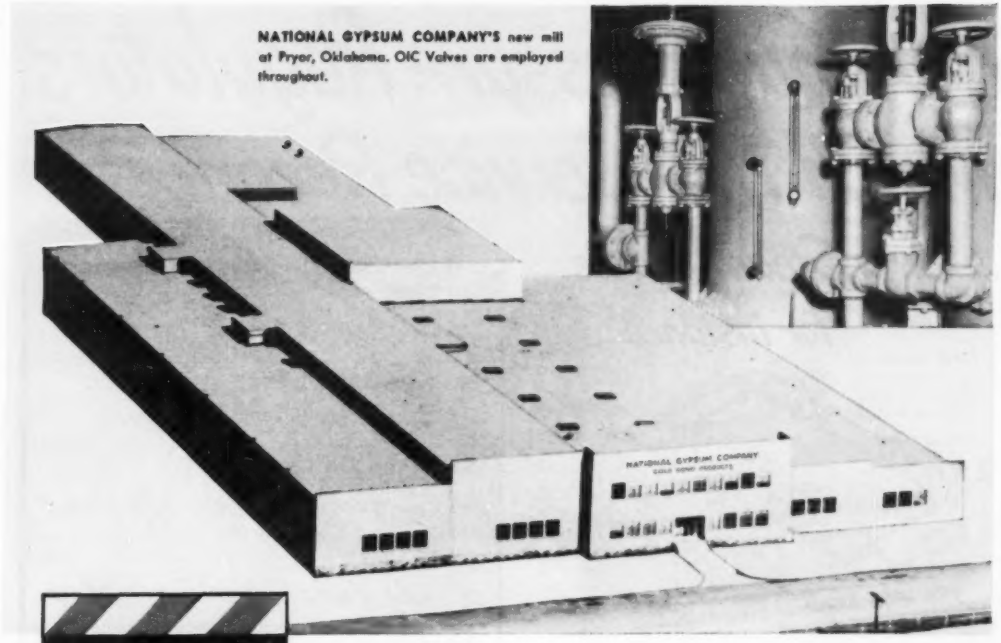
UNITED STATES STEEL



NATIONAL GYPSUM COMPANY'S new mill at Pryor, Oklahoma. OIC Valves are employed throughout.

BUILD BETTER WITH **Gold Bond**

...just as NATIONAL GYPSUM builds better with OIC VALVES

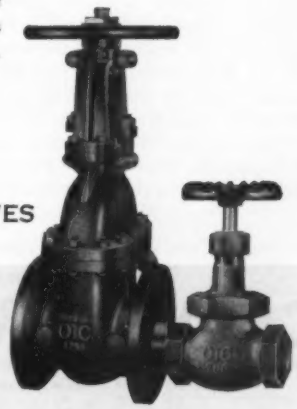
In line with their policy of placing plants within important market centers, National Gypsum Company has recently added this "push-button paper mill" at Pryor, Oklahoma. Here wastepaper is converted into a bonded eight-layer sheet for lining Gold Bond gypsum board, lath and sheathing.

Also conforming to their policy of using the highest quality products in their construction, OIC Valves were used at this new mill. OIC Valves are *precision engineered* and *precision built.* OIC engineers offer you *precision application* help.

THE OHIO INJECTOR COMPANY, WADSWORTH, OHIO

OIC
FOUNDED 1883

THE LONG LINE OF VALVES

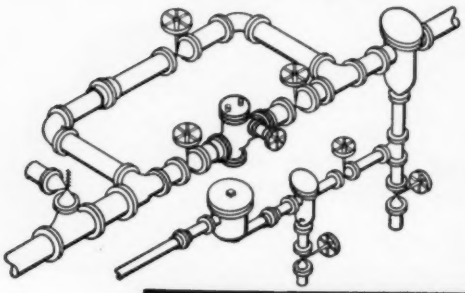


VALVES

FORGED AND CAST STEEL • IRON • BRONZE

Can Your Pressure Regulators Match This Service Record?

...on a Steam Kettle for instance



THE INSTALLATION

On steam supply line to cooking kettle, Schoenling Brewing Company, Cincinnati.

VALVE SERVICE RATINGS

SERVICE LIFE:	16 years - 24 hours per day
MAINTENANCE COST:	None - simple servicing only
SPECIAL FEATURES:	Good pressure range - easy adjustment
SUITABILITY:	Steady flow - no pressure build-up
OPERATING RESULTS:	Accurate control of cooking process
PRICE:	Low - considering service life
AVAILABILITY:	Stock item - Crane line

THE HISTORY

Specifications for this installation called for a regulator to reduce main line steam supply at 100 psi to 30 psi, and automatically maintain the reduced pressure to cooker, 24 hours daily, without significant fluctuation.

A Crane Pressure Regulator with factory pre-set range was selected and properly installed with adequate, automatic drainage of the steam lines.

For 16 years, throughout its lifetime, the Crane Pressure Regulator did its job to the brewery's complete satisfaction. Never was it out of service; never did it require more than the simple prescribed periodic inspection. (Note: current model has renewable wearing parts; will virtually never wear out.)

THE VALVE

Crane No. 960 Brass Pressure Regulators are made for reducing steam or air pressures up to 250 pounds, to within 80% of inlet pressure. They are factory pre-set to operate within any of 4 ranges from 1 to 200 pounds, with easily selected outlet pressure within set range. Precision made, they are fully automatic, highly dependable, even under reasonable fluctuation of inlet pressure. All wearing parts renewable. See your Crane Catalog or Crane Representative for complete data.

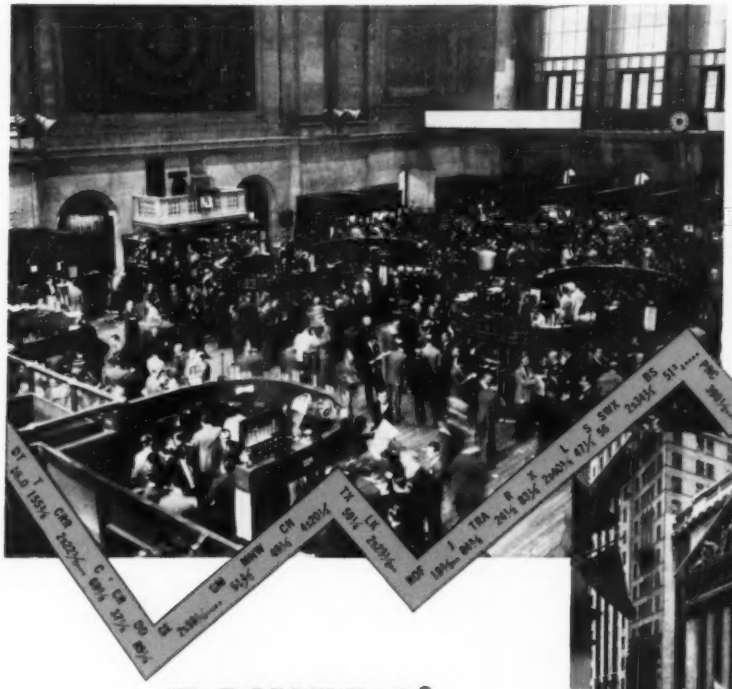
The Complete Crane Line Meets All Valve Needs. That's Why
More Crane Valves Are Used Than Any Other Make!

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

VALVE TOP—Durable, moulded neoprene diaphragm (1) has positive



NEW YORK STOCK EXCHANGE

The Nation's Largest Securities Market Place

BULLS and BEARS all agree on the value of air conditioned comfort

Consulting Engineer present air conditioning system: Charles S. Leopold

Mr. D. A. Kepler, Chief Engineer, in the photograph above, reports temperature is held within limits of approximately 1° F. plus or minus.

POWERS®

AIR CONDITIONING CONTROL

Used in this World Famous Securities Market

No matter how the "temperature" of the market fluctuates, air conditions on the trading floor of the Stock Exchange remain stable throughout the year.

Back in 1903 the New York Stock Exchange pioneered with the installation of a comfort cooling system which Mr. Donald A. Kepler, Chief Engineer describes as follows:

"It was one of the first systems of its kind applied to a large densely populated market place and by far the largest plant devoted primarily to air cooling and dehumidification. No controls were employed in the cooling season but in winter temperature and humidity were automatically controlled by a pneumatic system.

The air conditioning system now in use, the third since 1903, is modern and reflects the progress of air conditioning during the past 50 years."

Other Prominent Users of Powers Control

Toronto Stock Exchange • **Midwest Stock Exchange**

When temperature and humidity control problems arise contact Powers nearest office. Our 60 years of experience gained in many important buildings may be helpful to you.

Factory and General Offices: Skokie, Ill.

(a94)

OFFICES IN OVER 50 CITIES **THE POWERS REGULATOR COMPANY** Established 1891

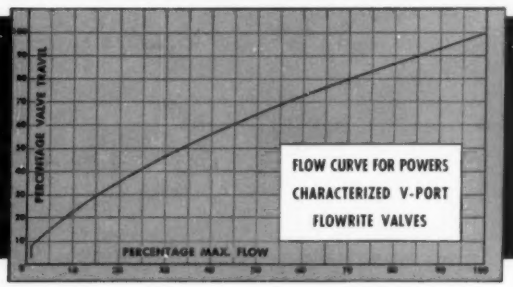
1
2
Special Cast Iron Housing and Top Only 4 Bolts
Compressed Air or Water Operated
BALL CHECK LUBRICATOR SILICONE grease for temperatures from 40° to 500° F.
Max. Pressure 250 psi.
Max. Temperature 450° F.
SIZES: ½" thru 2"
Direct and Reverse Acting

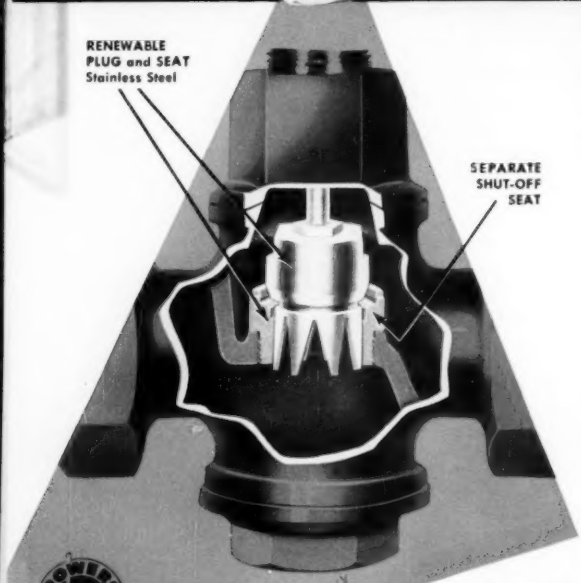
VALVE TOP—Durable moulded neoprene diaphragm (1) has positive sealing bead which provides increased sealing action with increasing control pressure. Efficient diaphragm form insures ample and constant operating power thru full travel. Piston Plate Assembly (2) has a free floating thrust plate which absorbs side thrust. Closely guided piston plate maintains stem in accurate alignment. Maximum air pressure in top, 22 psi.

POWERS® SINGLE SEAT V-PORT *Characterized* FLOWRITE VALVES Give—

Special Flow Characteristics—High lift V-Port plug provides proportional flow throughout entire lift of stem as shown in chart below.

Wide Variety of Valve Sizes—Nine sizes are available, ½" thru 2". The ½" valve can be furnished with plugs to give 15%, 30%, 60% or 100% of maximum capacity. Plugs are easily interchangeable without removing valve from line.





Better Control—Less Maintenance—Superior design of stainless steel plug and seat reduces wire drawing, insures longer life and tight shut off. V-Ports do the throttling, protecting separate shut off seat. Plug and seat are truly removable and can be easily replaced in the field. Inner valves are machined and precision ground and lapped within very close tolerances.

Low Hysteresis—Due to smooth rolling diaphragm and polished stainless steel stem in preformed lubricated packing.

Easy to Adjust—Ball bearing adjusting screw; rust proofed steel calibrated springs with full travel in 5 or 10 psi.

Easy to Install—Powers Flowrite V-Port valves have double unions and bronze body with rugged construction to withstand piping strains.

Easy to Service—Valve and top are easy to take apart and re-assemble, facilitating inspection and maintenance.

Reasonably priced. Contact our nearest office for prices and assistance in selecting proper size valves

THE POWERS REGULATOR CO.

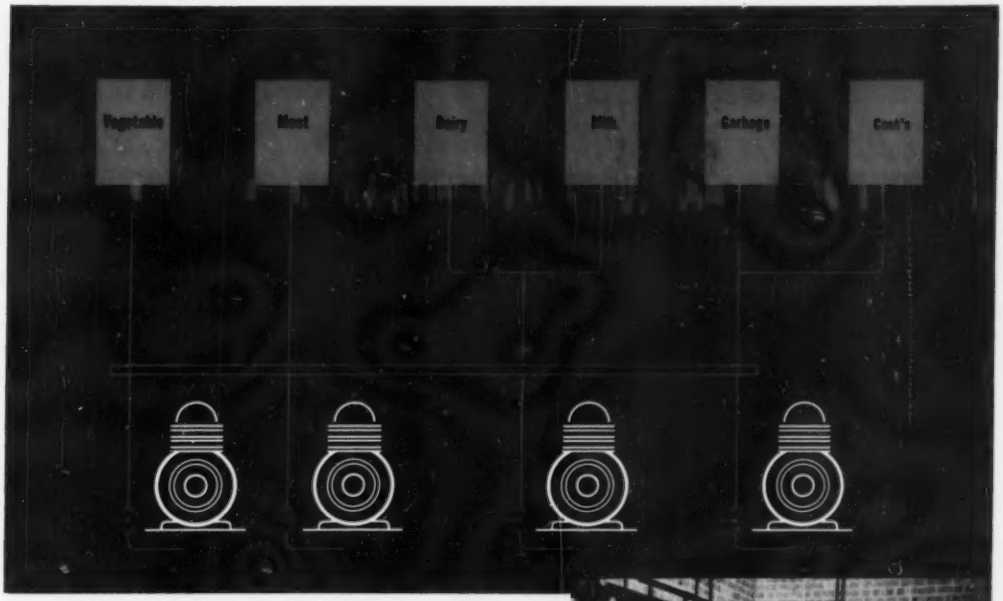
SKOKIE, ILLINOIS • Offices in Over 50 Cities

Chicago 13, Ill., 3819 N. Ashland Ave. • New York 17, N. Y., 231 E. 46th Street
Los Angeles 5, Cal., 1808 West 8th Street • Toronto, Ontario, 195 Spadina Ave.

OVER 60 YEARS OF TEMPERATURE AND HUMIDITY CONTROL

Ea701

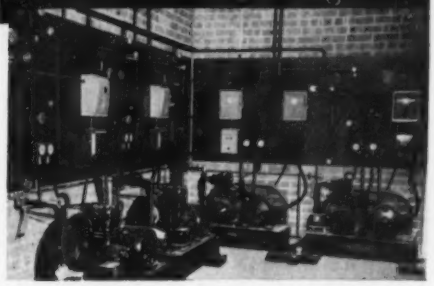
UNUSUAL REFRIGERATION SYSTEM USES ANACONDA Copper Tubes



No cooler shutdowns here for compressor repairs. Any one unit can be isolated.

4 compressors keep 6 coolers at different temperatures

Six walk-ins are a feature of the up-to-date refrigerating equipment in the spanking-new Memorial Hospital in Butte, Montana. Each maintains a different temperature range. There's small chance they'll ever fail to give round-the-clock service. The six coolers receive their refrigerant from four compressors. Should one unit fail, it can be instantly shut off for repair. A valve at the manifold does the trick. The other three units then carry the load.



Bank of 4 compressor units is equipped with AnacondA Copper Tubing and easily-installed American Vibration Eliminators. Arctic Refrigeration Service, Butte, Montana, made this interesting installation with AnacondA Copper Tube.

ANACONDA Refrigeration Tubes have a smooth, bright inside surface. They are uniformly soft for easy bending and flaring. Thoroughly cleaned and dehydrated beyond A.S.R.E. requirements, they are sealed and packed in single coil cartons for protection and easy handling.

For ANACONDA Copper Tubing and other ANACONDA Products see your regular wholesaler. He can give you reliable service. The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario. 8238A

These AnacondA Products for the refrigeration industry may be obtained through your wholesaler: Copper Tubing—Restrictor Tube—Bourdon Tube—Thermal Expansion Bulbs—Formed Tube Parts—Hard Copper Tube cut to length—Copper Water Tube in coils or straight lengths—Fittings—Vibration Eliminators—Flexible Metal Conduit.

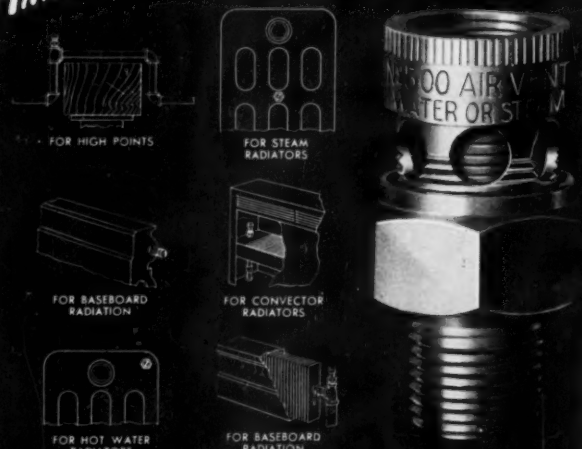
for consistent uniformity—ask for

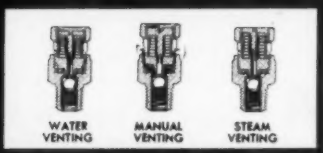
ANACONDA®
refrigeration products

HOFFMAN HOT WATER VALVES

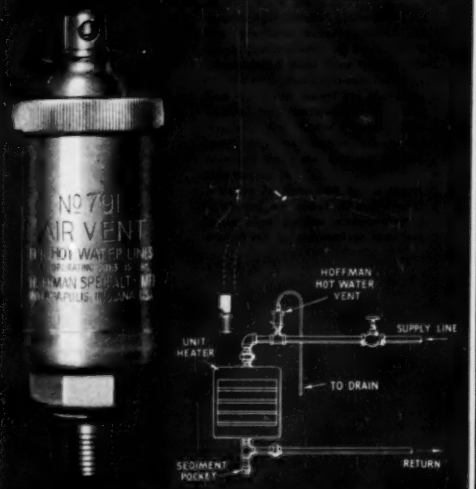
A TYPE FOR EVERY VENTING REQUIREMENT

ANNOUNCING No. 500 UNIVERSAL AIR VENT

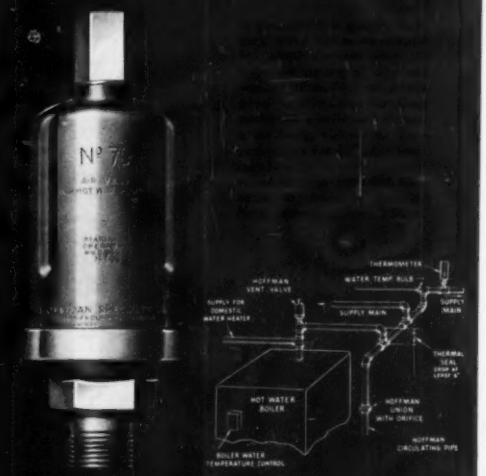




NO. 791 LOW PRESSURE HOT WATER VENT



NO. 79 HOT WATER VENT



HOFFMAN SPECIALTY MFG. CORP. • 1001 York Street, Indianapolis 7, Indiana

Makers of Valves, Traps, Hot Water Heating Systems, Vacuum and Condensation Pumps — Sold by Leading Wholesalers and Heating Contractors

FOR MEASUREMENTS FROM −100 F TO −300 F, G.E.'S TYPE HP-13 ON-OFF CONTROLLER GIVES STABILITY, ACCURACY, AND CONTROL SENSITIVITY

G-E Resistance-thermometers have High Accuracy; Can Be Calibrated within 1/2 of 1% Full Scale

Temperatures from −100 F to −300 F can now be accurately indicated and controlled with General Electric's new line of resistance-thermometers. If you have an operation which demands close, accurate control, then there is a G-E resistance-thermometer tailored to your needs. Under certain conditions accurate indication is within ½ of 1 per cent full scale.

CONTROL SENSITIVITY is built into G-E resistance-thermometers. A pointer motion not exceeding 0.1 per cent full scale length causes on-off operation in the presence of variations in voltage, ambient temperature, and frequency.

SPECIAL FEATURES include a mercury switch, rated 35 amperes for 120 volts a-c or 25 amperes for 240 volts a-c, available as an optional accessory for applications where heating loads exceed 10 amperes. When larger electrical capacity than that afforded by either control relay or mercury switch is required, a magnetic contactor can be supplied.

WIDESPREAD USE of G-E resistance-thermometers is a testimonial to their value. These close-control instruments can be used in refrigeration and food-processing industries, air-conditioning, medical and research laboratories, and in many applications where close control is a necessity.

MORE INFORMATION is available. Contact your nearest G-E representative, or write Section 602-230 for Bulletin GEC-835. *General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

BASIC ELEMENT of G-E resistance-thermometers is crossed-coil moving element and 3¼-pound alnico V magnet; designed to stand abuse.

TYPE HP-14 three-position resistance-thermometer with two-plug-in control units; shown with covers removed for easier maintenance.

THESE FIVE SIMPLE STEPS

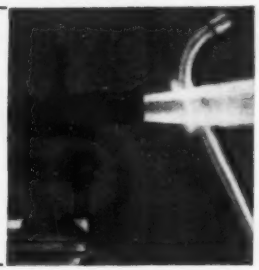
make a solder-joint!

Properly soldered connections between Chase Solder-Joint Fittings and Chase Copper Water Tube are exceptionally strong and pressure-tight. Assemblies of ½" Chase Copper Water Tube and Solder-Joint fittings have withstood over 3,400 pounds pull, and 5,000 pounds water pressure per square inch. Jobs last longer, and look better, with Chase Copper Water Tube and Solder-Joint Fittings.

1 Polish the outside of the tube and inside of the fitting with No. 00 steel wool or fine grade sand cloth.

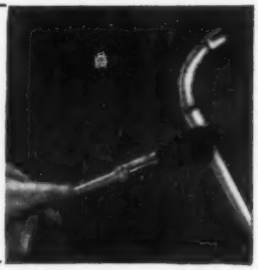
2 Apply thin coat of flux to tube and inside of fitting. Place fitting on tube and remove excess flux.

3 Heat joint evenly with a blow-torch. Remove flame and apply solder to joint. Solder will melt from wire at correct temperature.



4 Capillary attraction draws solder into joint. When solder shows around edge of fitting, connection is completed.

5 Remove excess solder with a brush. Do not place any strain on the joint until it has cooled.



Chase BRASS & COPPER

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Baltimore	Denver†	Milwaukee	Pittsburgh	Waterbury
Boston	Detroit	Minneapolis	Providence	(Sales
Chicago	Houston†	Newark	Rochester†	office only)
Cincinnati	Indianapolis	New Orleans	St. Louis	

Send the coupon for folders on Making Solder-Joint, and Flared connections with Chase Copper Water Tube.

Chase Brass & Copper Co.
Waterbury 20, Conn.

Dept. HP-1152

Please send me free folders on How To Make Solder-Joint and Flared connections.

Name_____

Position_____

Firm_____

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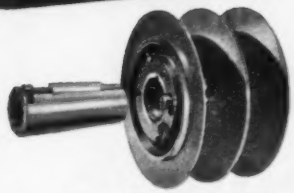
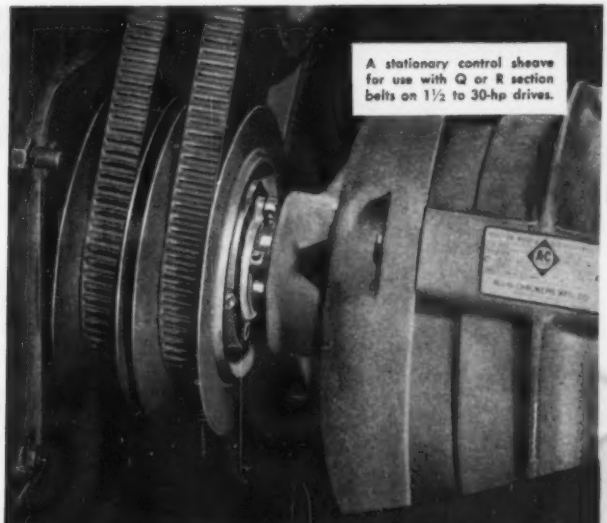
City_____ State_____

TEXROPE





A stationary control sheave for use with Q or R section belts on 1½ to 30-hp drives.

NOW!

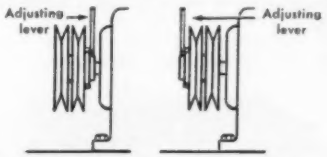
Wide Range has 3 New Advantages

1 Magic-Grip Mounting

The widely used *Magic-Grip* tapered bushing is now supplied with the Wide Range *Vari-Pitch* sheave, making it the fastest mounting sheave of its type on the market. Turning only one screw makes or breaks the vise-like grip of sheave bushing on motor shaft.

2 Fast Adjustment

To change sheave diameter — thereby changing speed — simply turn a single adjusting screw, *using a lever rod* that slips through a hole in the head of the screw. No more fumbling with screw drivers. Adjustment is fast and accurate.



3 Adjusts From Either Side

Sheave can be mounted on motor shaft so adjusting screw is either toward or away from motor bearing, as indicated above. This feature is especially important in installations where space for adjustment is limited. It's the only sheave of its type with this feature.

GET COMPLETE DATA FROM YOUR NEARBY ALLIS-CHALMERS DISTRIBUTOR OR DISTRICT OFFICE, OR SEND COUPON.

ALLIS-CHALMERS
MILWAUKEE 1, WIS.

Send me complete specifications and engineering data on the new Wide Range *Vari-Pitch* sheave . . . 20S7811.

Name.....

Title.....

Company.....

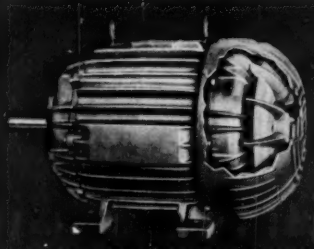
Street.....

City.....State.....

A-3841

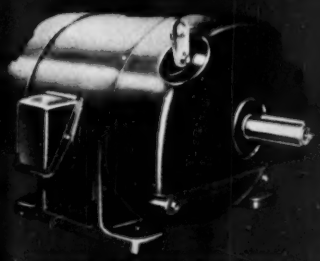
Texrope, Vari-Pitch and Magic-Grip are Allis-Chalmers trademarks.

ALLIS-CHALMERS



"Sealedpower" totally-enclosed squirrel-cage motor. Cooled and cleaned by exterior fan-driven air blast directed along radiating fins. 3 to 1 to 125 hp. Explosion-proof, 20 to 1 to 125 hp.

Here's motor ruggedness you can bank on!



Squirrel-cage splash-proof Form BA. Has corrosion-resistant covers which prevent entrance of splashing liquids.

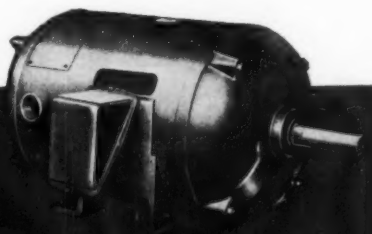
. . . the

Available in NEMA frames 203 through 505. Open drip-proof . . . splashproof . . . with NEMA D flange or C face . . . horizontal . . . vertical . . . round frame.

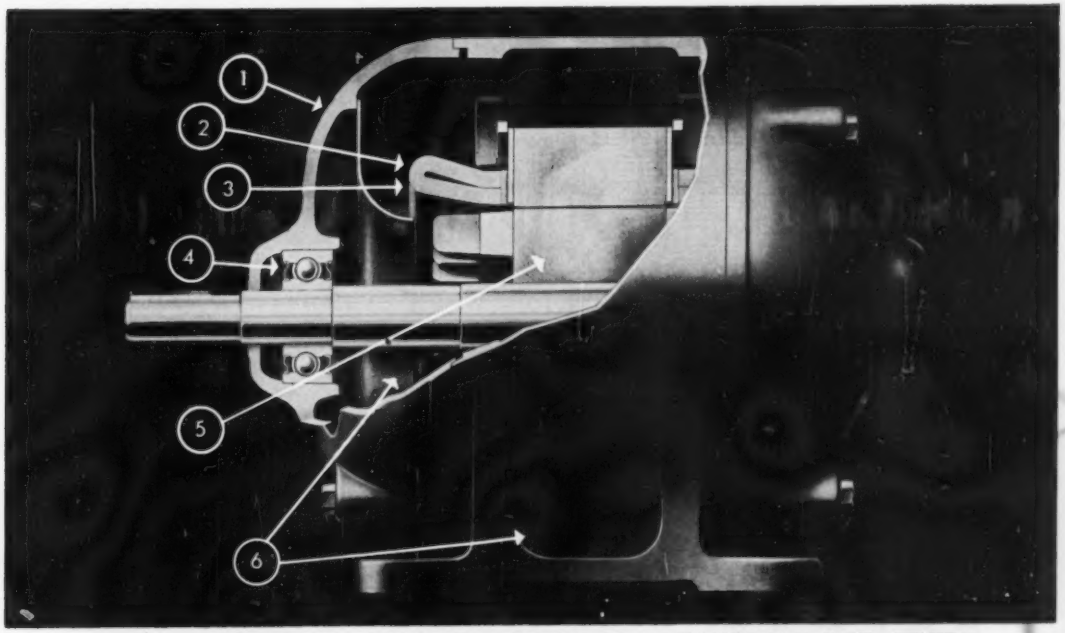
. . . Also available with the Crocker-Wheeler brake. This is a motor that has given thorough satisfaction in the widest variety of applications, from textile machinery and machine tool drives, to air conditioning service in many large modern buildings. For details contact your local Elliott representative or write Elliott Company, Jeannette, Pa.

Mill motor, W600 Series, DC. Conforms in all respects to AISE standards. Offers more power without an increase in the frame size.

. . . with the ELLIOTT CROCKER-WHEELER complete motor line, you can meet 'most any integral motor need!



Wound-rotor protected type Form BW. For slow, smooth acceleration, high starting torque with low starting current, or variable speed. Drip-proof, splash-proof, 1 to 200 hp.



ELLIOTT CROCKER-WHEELER *Squirrel-cage* INDUCTION MOTOR

Here is a continuous-duty general purpose motor soundly engineered right up to the Crocker-Wheeler standard, with every qualification for premium performance and extra long life. Check over these features:

1. *Rigid gray iron end shields* for solid bearing support and permanent alignment.

2. *Vinylastic wire* thoroughly impregnated and baked, on all stators.

3. *Corded end turns* for strength and permanence and *phase-to-phase insulation* to give further assurance of long life.

4. *Sealed prelubricated bearings* needing no attention in years of service.

5. *Alucast rotors* practically indestructible —bars, fans and end rings are one solid piece.

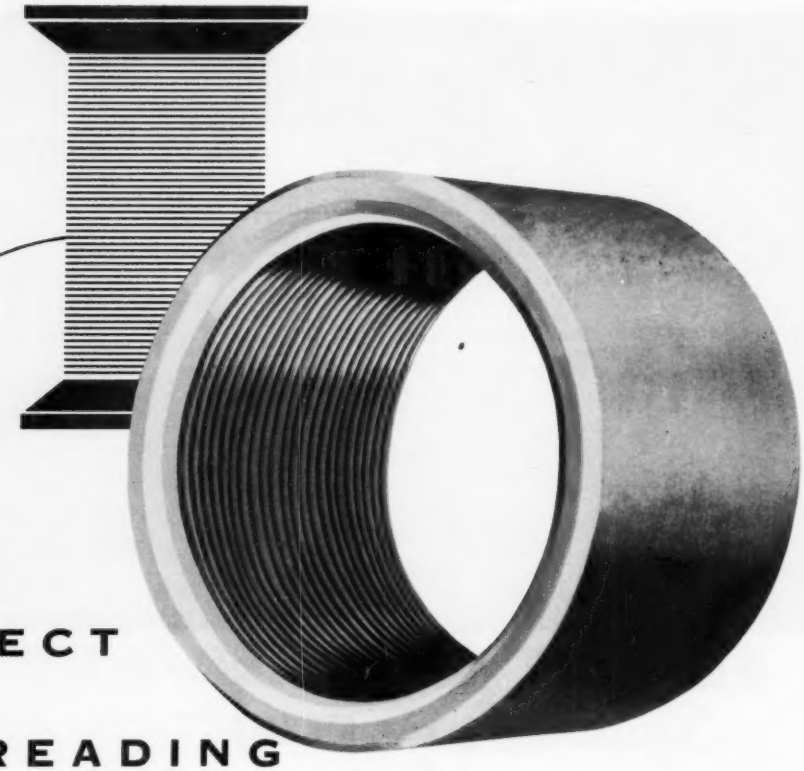
6. *Dual ventilation* from both ends of rotor, discharged out each side of the frame.

ELLIOTT COMPANY
Crocker-Wheeler Division

Squirrel-cage protected type Form BA. An open drip-proof motor for general purpose use. It is available in wide modifications to meet a variety of conditions.

DC drip-proof and drip-proof-protected types. Form F, in ratings to 7½ hp. Form H, in 10 to 200 hp.

Squirrel-cage, totally-enclosed, non-ventilated Form BE. Available up to and including 3 hp at 1800 rpm, for applications requiring protection against dust, fumes, moisture.



PERFECT THREADING

It's the little things that count . . . in making Wheatland precision couplings. When you realize the importance of couplings to the plumber you know that selling him a quality product makes his job easier. That's why Wheatland watches all the little things . . . to make certain that threads are accurate, firm and precise.

Specify Wheatland precision couplings made by men who know pipe.

precision couplings by

WHEATLAND STEEL PRODUCTS COMPANY

BANKERS SECURITIES BUILDING, PHILADELPHIA 7, PA.

Seneca Textile's new building, New York City. Architects and Engineers: Alfons Bach, Inc. *Contractors:* George A. Fuller Co.

Horizontal air discharge — best for cooling and low mounting height without flush ceiling.

Moderate downward air discharge — best for average conditions.

Extreme downward air discharge — best for warm air heating and high mounting without flush ceiling.

Handsome air diffusers that do a better job

● With no other tool than a screw driver, you can easily and accurately adjust the air flow from a Kno-Draft Air Diffuser from horizontal to almost vertically downward—and do it *after* installation.

Think what this can mean in reducing your preliminary figuring for a job . . . and increasing customer satisfaction with the operation of the system. Kno-Draft *Adjustable* Air Diffusers are top performers under all conditions.

Yet adjustability after installation is only one of many reasons why Kno-Draft Air Diffusers are rapidly becoming the preferred units for both commercial and industrial installations.

For the complete Kno-Draft story, mail the coupon today to W. B. Connor Engineering Corporation, Danbury, Connecticut.

CONNOR

kno·draft

adjustable air diffusers

W. B. CONNOR ENGINEERING CORP.
Dept. G-112, Danbury, Connecticut

Please send me the *new edition* of the Kno-Draft Data Book—without obligation, of course.

Name _____

Position _____

Company _____

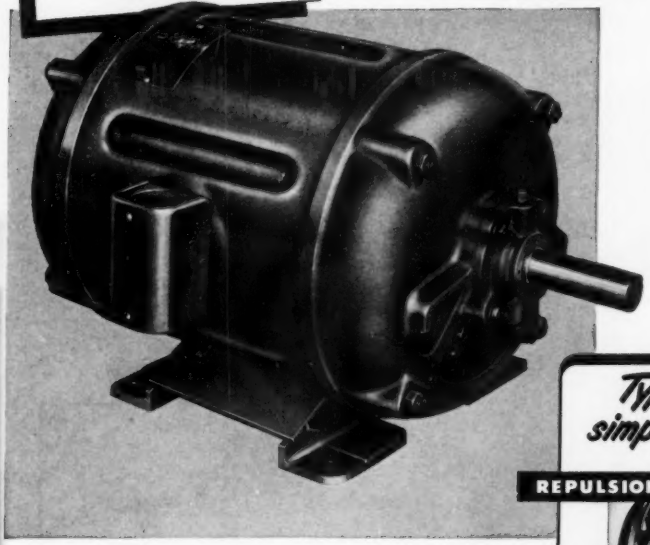
Street _____

City _____ **Zone** _____ **State** _____

Wagner
ELECTRIC MOTORS
...the choice of leaders in industry

Wagner
Type RA Motors—

dependable
versatile
troublefree



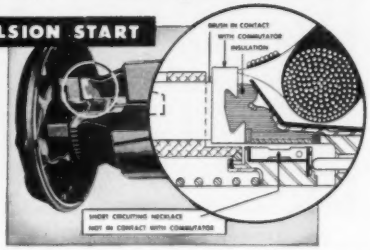
So many manufacturers of motor-driven equipment and appliances in every type of industry have chosen the Wagner Type RA repulsion-start induction motor as standard equipment for their products that it has become known as industry's general purpose motor.

Type RA is first choice for single-phase applications because of its ability to start heavy loads with low starting current. This makes it especially suitable for machines that have high inertia or heavy friction at starting. Then, too, Type RA is chosen because it gives years of reliable service . . . is economical to maintain . . . requires only minimum servicing . . . and is free from vibration and noise.

When you standardize on Wagner Motors—you get the advantages of a liberal warranty . . . of nationwide service facilities, with replacement motors and parts available from 25 Wagner-owned Service Branches and more than 650 Authorized Service Stations. You can choose from a wide variety of types and sizes (from 1/125 to 400 hp). Bulletin MU-185 gives complete information—write for your copy.

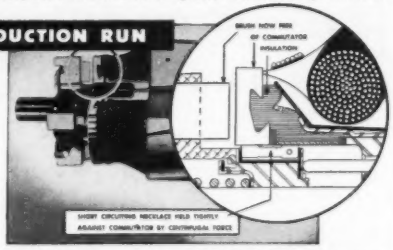
Type RA offers the most simplified design to provide:

REPULSION START



Starting period—Short-circuiting necklace is not in contact with commutator bars. A governor spring holds barrel in starting position. Brush assembly completes selected circuits enabling motor to start as a repulsion motor.

INDUCTION RUN


BRUSH NOW RIDES ON COMMUTATOR INSULATION
SHORT CIRCUITING NECKLACE HELD TIGHTLY AGAINST COMMUTATOR BY CENTRIFUGAL FORCE

Running period—Governor weights (actuating pushrods) have forced spring barrel forward until short-circuiting necklace connects commutator bars to short-circuiting ring, forming a "squirrel cage" to permit operation as an induction motor.

WAGNER ELECTRIC CORPORATION
6370 Plymouth Ave., St. Louis 14, Mo., U.S.A.

Wagner Electric Corporation EST. 1891

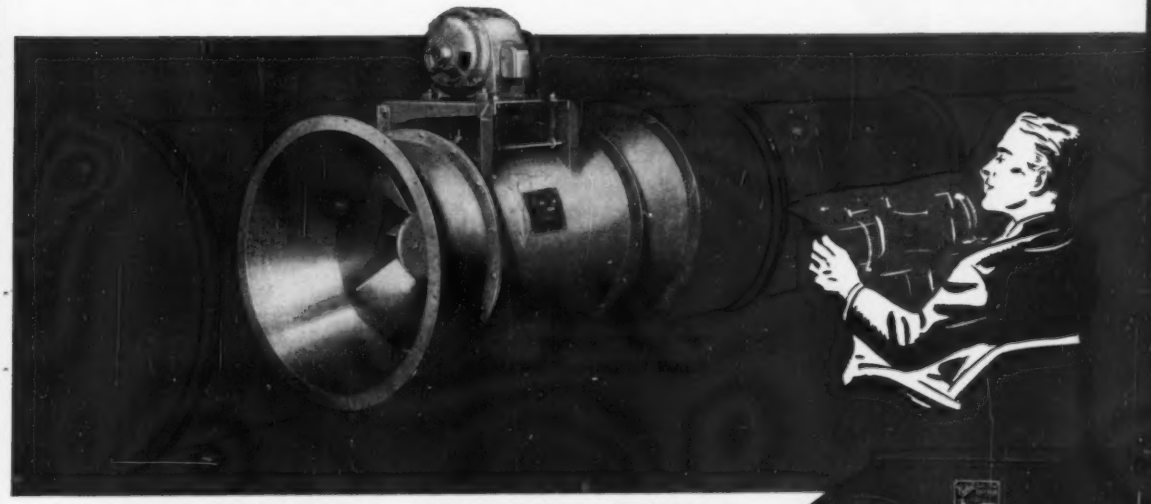
ELECTRIC MOTORS · TRANSFORMERS · INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

MU-185

"Buffalo" *Tips on Getting the Best Service from your* **Fans**

PICK THE FAN TO SUIT THE PLAN!



THE AXIAL FLOW FAN
Forms a Straight Duct Section

For Ventilating and Air Conditioning service, where your piping will be straight, this Axial Flow Fan is ideal. Fitting in as a section of pipe, it requires little more cubic space than does the pipe. "Buffalo" Fans like the Type "B" Vaneaxial above, are also relatively light, which reduces installation cost. Also, this type of fan is unusually efficient in these straight duct runs. Another advantage in "Buffalo" Axial Flows is their limit-load characteristic — you cannot overload them, regardless of system pressure.

For Performance Curve and other useful information on "Buffalo" Axial Flow Fans, write today for Engineering Bulletin 3533-C.

The Centrifugal Fan, like this "Buffalo" Limit-Load Fan, forms a built-in 90-deg. elbow. If your system is to have many curved connections, consider this type of fan. Details are in Bulletin 3737. Write for your copy.

"Buffalo" FIRST FOR FANS

BUFFALO FORGE COMPANY

171 MORTIMER ST. BUFFALO, NEW YORK

PUBLISHERS OF "FAN ENGINEERING" HANDBOOK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont. Sales Representatives in all Principal Cities

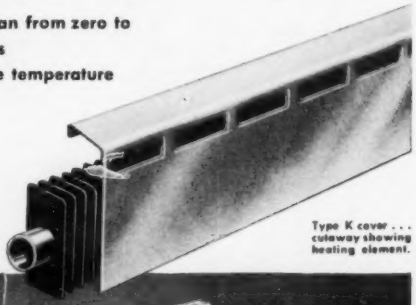
VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING
FORCED DRAFT COOLING HEATING PRESSURE BLOWING

On top of the world with Vulcan ...at 60 degrees below

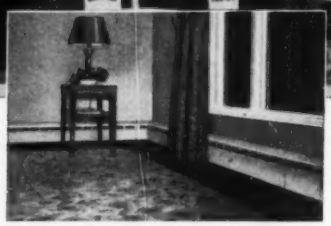
Says ALDEN WILBUR

Prominent Plumbing and Heating Contractor in Fairbanks, Alaska

"For a period of almost three weeks the temperature ran from zero to sixty below. Sometimes, the temperature would drop as much as 40 degrees in three hours. In one instance, the temperature held between 50 and 60 degrees below for a *full* week. All during this cold period not at any time did the temperature in the house vary from that set by the thermostat. I carried the water temperature in the boiler at 180 degrees and did not at any time increase this setting.



Type K cover . . . cutaway showing heating element.



On one of the coldest days I tried to find out how much of the time the oil burner and circulating pump were in operation, as near as I could tell at 60 below zero the pump ran about 80% of the time and the burner about 50%. I am more than pleased with the Vulcan set-up and I am sure that my experience will help sell more installations next summer."

Here's proof of Vulcan's performance

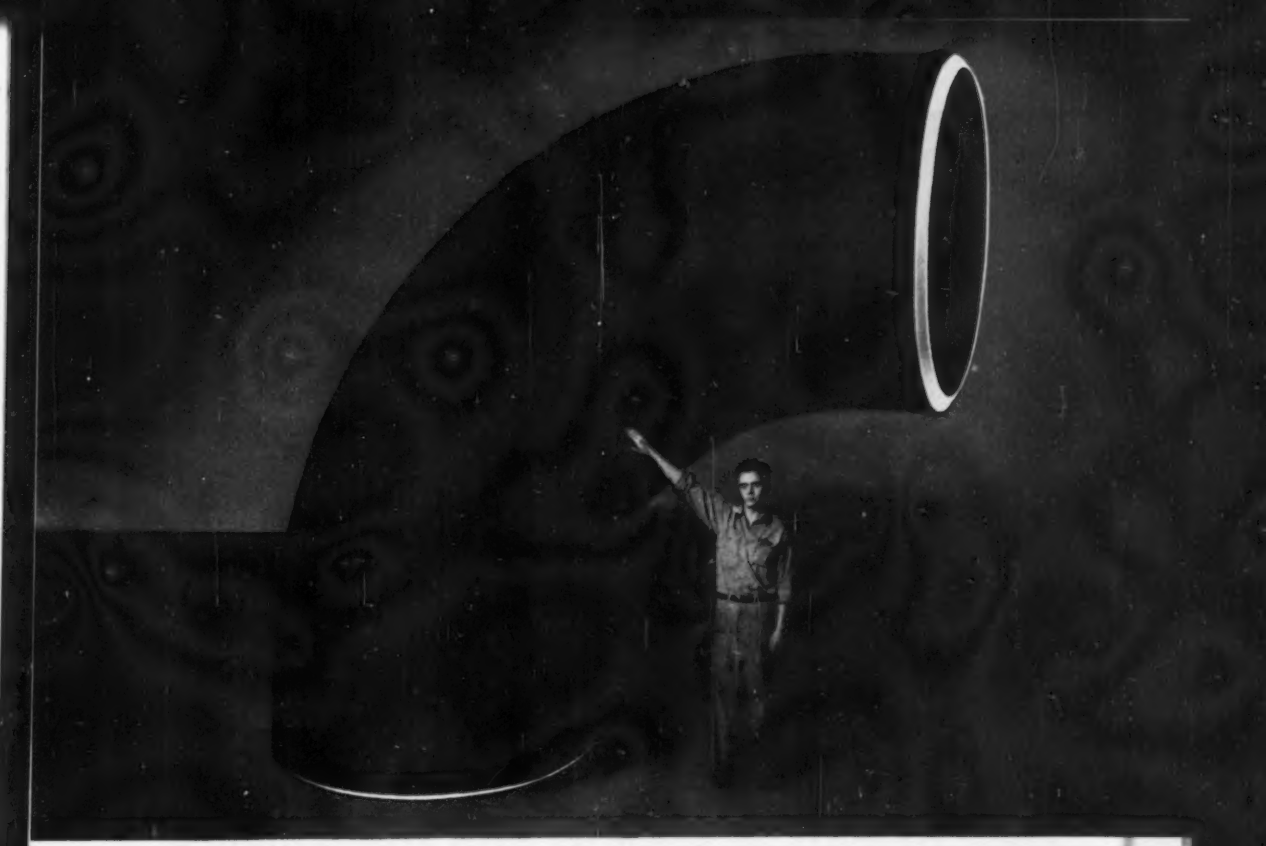
Vulcan Baseboard Radiation (Radi-Vector) provides heat output that guarantees comfort under the most adverse conditions. Time-tested . . . the standard for efficient heating and economic operation . . . for over a quarter of a century.

Made in Canada Under Trade Name of Heal Radiation by the Vapor Car Heating Co. of Montreal.

VULCAN

The VULCAN RADIATOR Co.

16 Francis Avenue, Hartford 6, Conn.



We Haven't Made Them This Big... *YET,*

but this photographic fantasy is simply to remind you that we do manufacture the most varied line of welding elbows on the market.

MIDWEST
PIPING & SUPPLY CO., Inc.

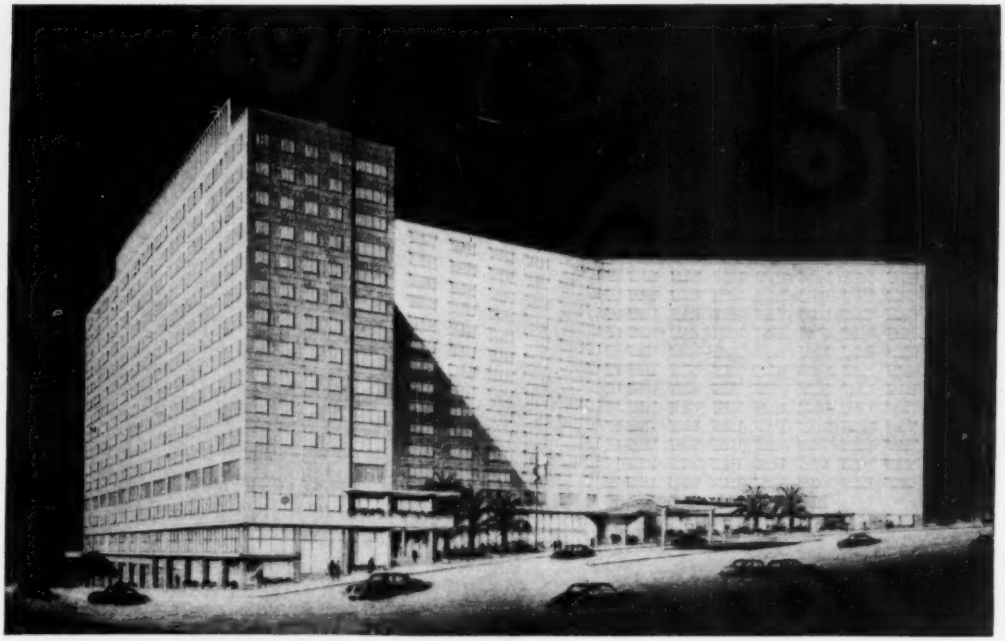
Main Office: 1450 South Second Street, St. Louis 4, Mo.
Plants: St. Louis, Passaic, Los Angeles and Boston
Sales Offices: New York 7—50 Church St. • Chicago 3—79 West Monroe St.
Los Angeles 33—320 Anderson St. • Houston 2—1213 Capitol Ave.
Tulsa 3—224 Wright Bldg. • Boston 27—436 First St.
STOCKING DISTRIBUTORS IN PRINCIPAL CITIES

Same radius as ASA but tangent equal to 25% of nominal pipe size on each end. Saves pipe, layout and welding time. Costs no more than ASA. Sizes to 24".

Dimensions conform to applicable size range of American Standard for Butt-Welding Fittings, ASA B16.9. Tolerances much less than allowable. Sizes to 26".

Recommended where space limitations do not permit use of "Long Tangent" or ASA Elbows. Sizes to 30".

Takes the place of a straight size elbow and a reducer. Eliminates one weld, reduces pressure drop, easier to insulate. Sizes to 12", reductions to half size.



Architects and Engineers: Holabird & Root & Burgee, Chicago, Ill.
Associate Architect: William B. Tabler

New heights in comfort and convenience for the biggest hotel built in twenty years

THE NEW STATLER HOTEL now nearing completion in Los Angeles, represents the ultimate both in its appointments and construction. Comfort, convenience and efficiency are stressed throughout. Every room is air conditioned. There's an off-street concourse for motorist-guests who are checked in and whisked to their rooms without even going through the lobby. Dimmers on the ballroom lights, under-water lighting for the swimming pool, music in the passenger elevators are luxurious innovations typical of this truly modern hostelry.

And, though guests are unaware of it, their safety and comfort are further insured by NATIONAL Steel Pipe—325 tons of it—used in the heating, fire-sprinkler and dry fire systems, as well as for vacuum lines.

Here, as in other famous hotels, apartment houses, schools, hospitals, office and public buildings, NATIONAL Steel Pipe was selected because of its consistently high record of service dependability.

U·S·S NATIONAL has been the standard pipe for over 60 years for conventional hot water and steam heating systems; for fire control and plumbing lines, and the first choice for modern radiant heating and snow melting applications described in Bulletin No. 19—Radiant Heating With National Pipe. Copy upon request.

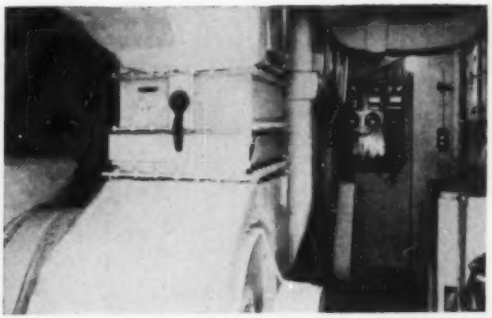
NATIONAL TUBE DIVISION

UNITED STATES STEEL COMPANY, PITTSBURGH, PA.

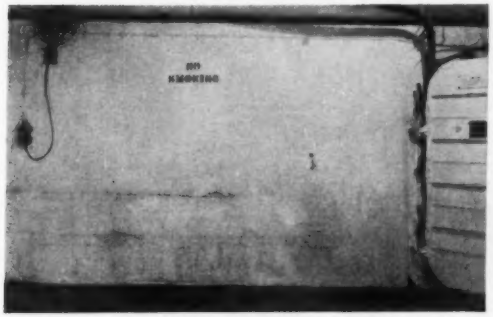
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL

A representative air duct on S. S. United States, with insulation surfaced by Foster Sealfas.



Insulation on fan housing and warm air ducts showing Foster Sealfas protection.



Mess quarters of U.S.S. Arneb, two years after application of Foster Sealfas and Sealfas Lagging Cloth. Severe abuse by sliding tables and benches has not broken surface.

Brush application of Sealfas directly to insulation surface. Sealfas Lagging Cloth or other approved membrane is imbedded into coating and followed by second coat of Sealfas.

Any insulation can take a beating when it has Sealfas* protection

For resistance to rough treatment, in areas of heavy traffic and damage by tools and ladders, the Foster Sealfas* system of industrial insulation surfacing is ideal. Easily applied, white and washable for cleanliness, fire-retardant Sealfas in conjunction with Sealfas Lagging Cloth can withstand puncture and other abuse to an average bursting pressure of 450 pounds per square inch.†

Foster Sealfas has been specified as the surfacing for duct, pipe, and bulkhead insulation in the heavily-traveled crew spaces of U. S. Military Sea Transport Ships; Sealfas was used on insulation throughout the air conditioning duct system of the new superliner United States. Sealfas can give its rugged protection to the insulation on your next project requiring maximum resistance to mechanical abuse *regardless of the insulating materials used.*

Pipe lines, ducts, vessels, equipment—anything requiring thermal insulation and subjected to extraordinary surface abuse—will be protected more efficiently, more economically with Sealfas and Sealfas Lagging Cloth than with uncertain, halfway surfacing measures. Of course Sealfas works well with other membranes, too (such as 8-ounce canvas).

Write for Index to Foster Specifications

*T.M. Reg. U.S. Pat. Off. Benjamin Foster Company.
†Tests conducted on Mullen Tester. Details on request.

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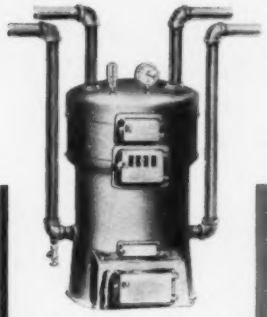
BENJAMIN FOSTER COMPANY · PHILADELPHIA 31, PA.

Makers of LAGFAS • SEALFAS • FIRE-RETARDANT MASTICS • TRI-GUARD COATINGS • ADHESIVES, SEALERS, AND SURFACE COATINGS FOR INSULATION AND INDUSTRIAL USES

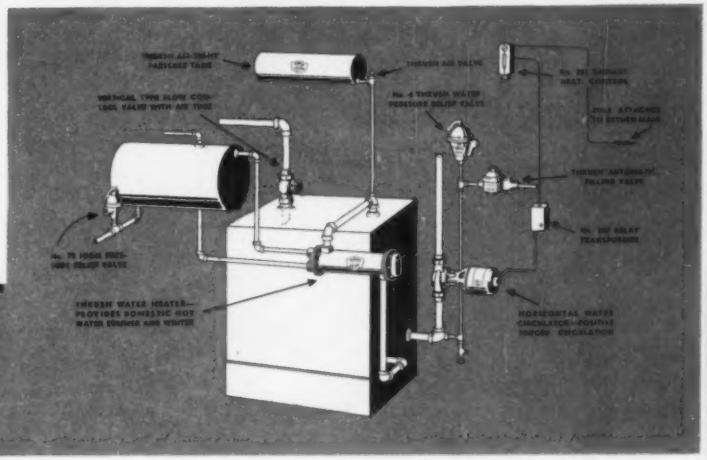
The JOY AXIVANE® FAN
Mounts Right in the Air Duct—
Saves space, installation costs, gives you quieter, more efficient ventilation!
A JOY Axivane Fan in a commercial store—chosen for its low noise level, compactness, and simple and easy installation.
Write for Bulletins, or
Consult a Joy Engineer
JOY MANUFACTURING COMPANY
GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.
IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO



There are many old installations like this in every community just waiting for you! Go after them with a Thrush modernization plan.

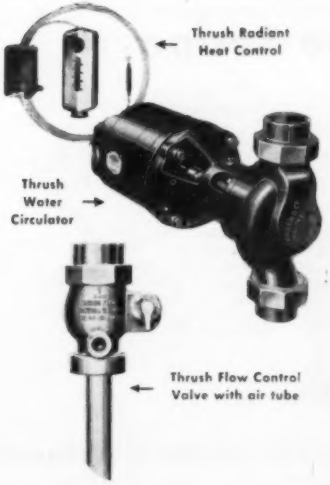
Modernize old heating plants now . . . with Thrush Equipment

Any hot water heating system can be converted easily into a modern, forced circulating heating plant with a few inexpensive Thrush units.



THRUSH . . .

Flow Control System of Radiant Hot Water Heat!



THRUSH Flow Control System installed on old hot water heating plants gives controlled comfort in every room in the house. Many homeowners would modernize if they knew it was possible to convert to a modern system at such moderate cost. A Thrush Water Circulator with Thrush Flow Control Valve will provide positive circulation without overheating. Thrush Water Heater will assure a plentiful supply of domestic hot water from the same boiler in summer and the whole year through. If you are not now installing Thrush equipment, see your wholesaler or write Department E-11.

H. A. THRUSH & COMPANY
PERU • INDIANA

The Cook Who Discovered the Recipe...

Almost 50 years ago, C. A. Dunham Company introduced the first successful fluid-filled thermostatic radiator trap . . . and steam heating became practical, economical, popular.

Since that time, Dunham has developed a complete line of heating specialties: float and thermostatic traps, inverted bucket traps, radiator valves, elbows, strainers, fittings.

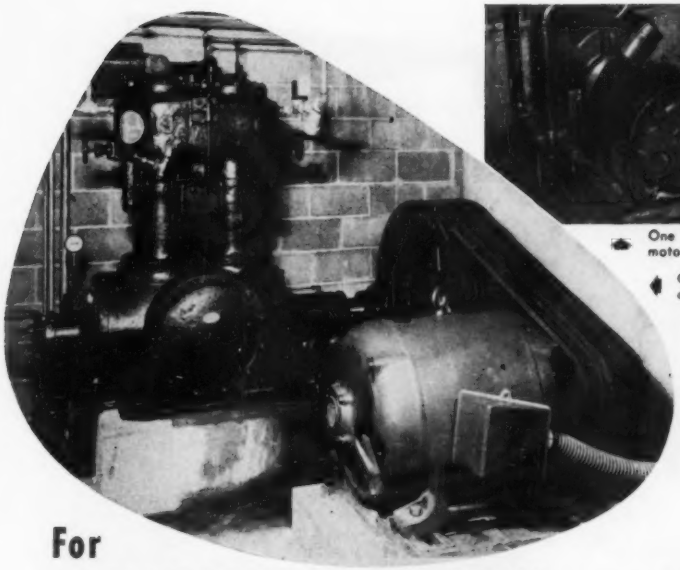
Today, in hundreds of thousands of installations from coast to coast, these top quality products are delivering the dependable, long-lasting, low maintenance service so essential to efficient heating systems. Their performance is proof, customers say, that "no one can bake a cake as well as the cook who discovered the recipe."

Heating Specialties Bulletin 1501-2 contains complete data—special features, applications, capacities, etc. Please write for your free copy to C. A. Dunham Co., 400 W. Madison St., Chicago 6, Ill.

DUNHAM **HEATING SPECIALTIES**

QUALITY PRODUCTS OF C. A. DUNHAM COMPANY • CHICAGO • TORONTO • LONDON

YOUR NAME HERE



One 10 horsepower and a 25 horsepower Century motor furnish power to air condition an office.

Century 75 horsepower Type SCH motor driving a compressor in a skating rink.

Unusually Quiet Starting and Running Characteristics

For
REFRIGERATION COMPRESSORS
You Need the High Starting Torque of . . . . .

Century

Type SCH Motors

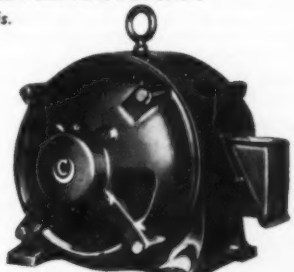
Century Type SCH, Squirrel Cage polyphase alternating current High Torque motors are ideal for refrigeration compressor applications. They bring compressors up to speed smoothly and easily under full load.

Century Type SCH motors have the high starting torque characteristics required for Refrigeration Compressors. The low starting current is desirable for automatic across the line starting.

In addition, Century builds a complete line of electric motors in a wide range of types, in sizes from 1/8 to 400 horsepower. Specify Century motors for all your electric power requirements.

Century Service Is Near Any Century Motor Driven Equipment. Prompt Service is offered by CENTURY'S National Network of more than 200 Authorized Service Stations, supervised by 28 Century Sales offices.

1. *Facilities for immediate exchange of most CENTURY standard ratings of standard construction are available at CENTURY Authorized Service Stations.*
2. *CENTURY Authorized Service Stations are qualified and equipped to service and repair any piece of CENTURY apparatus.*
3. *Genuine CENTURY renewal parts are available at CENTURY Service Stations, CENTURY Parts Distributors and at the factory in St. Louis.*



CENTURY ELECTRIC COMPANY • 1806 Pine Street, St. Louis 3, Missouri
Offices and Stock Points in Principal Cities

Century C MOTORS

702

NEW

HEAT SAVING EFFICIENCY

with Mundet 85% Magnesia

Send for Complete New Catalog

Mundet district offices are conveniently located coast-to-coast.

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35 Booth Avenue, Toronto

Now available in pipe covering and block insulation, Mundet Custom-Molded 85% Magnesia permits new heat-saving efficiency.

You benefit from these advantages when you use Mundet 85% Magnesia Insulation.

- ***Easier to Apply***
  It cuts easily and cleanly, even without canvas support. No chipping, crumbling or "powdering." Blocks score cleanly.
- ***Lighter Weight***
  Only 11 lbs. per cubic foot density. Even larger sizes and thicknesses are easy for one man to handle.
- ***Controlled Uniformity***
  Precision manufacture on the latest type of equipment insures uniform standards.
- ***More Durable***
  Greater "ductile strength" is built into the insulation. It does not "powder," settle or disintegrate even with heavy vibration. It withstands handling and may be removed and reapplied if necessary.
- ***Does not Shrink or Warp***
  Steam or water leakage does not affect it. It does not shrink or warp even after soaking.
- ***Attractive Smooth Finish***
  No unsightly, inefficient "bagging." Mundet 85% Magnesia insulation retains its neat appearance and effectiveness.
- ***Precision Pipe Fit***
  No spaces are left for the escape of heat. The whole heated surface is snugly enclosed.

Write for specification information and recommendations. Mundet Cork Corporation, Insulation Division, 7113 Tonnelle Avenue, North Bergen, N. J.

INSULATION FOR HIGH AND LOW TEMPERATURE

famed for buying only the best

buys SPANG® CW STEEL PIPE

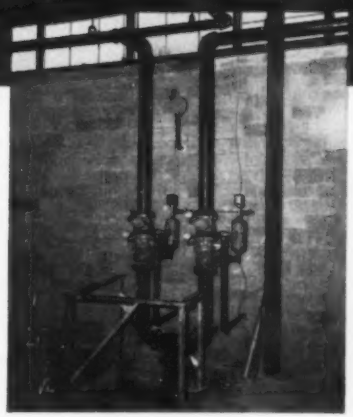
From all over the world S. S. Pierce Company imports the very finest of foods to please America's most discriminating buyers. So, naturally, S. S. Pierce has a quality-minded management—a management well aware that the best product is *always cheaper in the long run.*

In their new, big warehouse at Newton, Mass., for instance, S. S. Pierce selected materials with extra care . . . used Spang CW Steel Pipe extensively.

There's a good reason why Spang pipe has such acceptance with careful owners, contractors, builders—*from steel shelp to finished pipe it's a quality-controlled pipe.* Each piece starts with steels selected for very special characteristics . . . continues with the strictest metallurgical control during forming . . . concludes with final inspection and reinspection.

Which explains why Spang Steel Pipe has just the right temper for easy cutting, easy forming, easy threading . . . features that speed installation and reduce installation costs.

Don't just order pipe . . . order the *better* pipe from your Spang distributor.



Owner: S. S. Pierce Company, Boston, Mass.
General Contractor: W. H. Porter Company, Inc., Watertown, Mass.
Sprinkler Contractor: Viking Automatic Sprinkler Company, Inc., Boston, Mass.
Pipe Fabricator: Atlantic Pipe & Supply Company, Boston, Mass.

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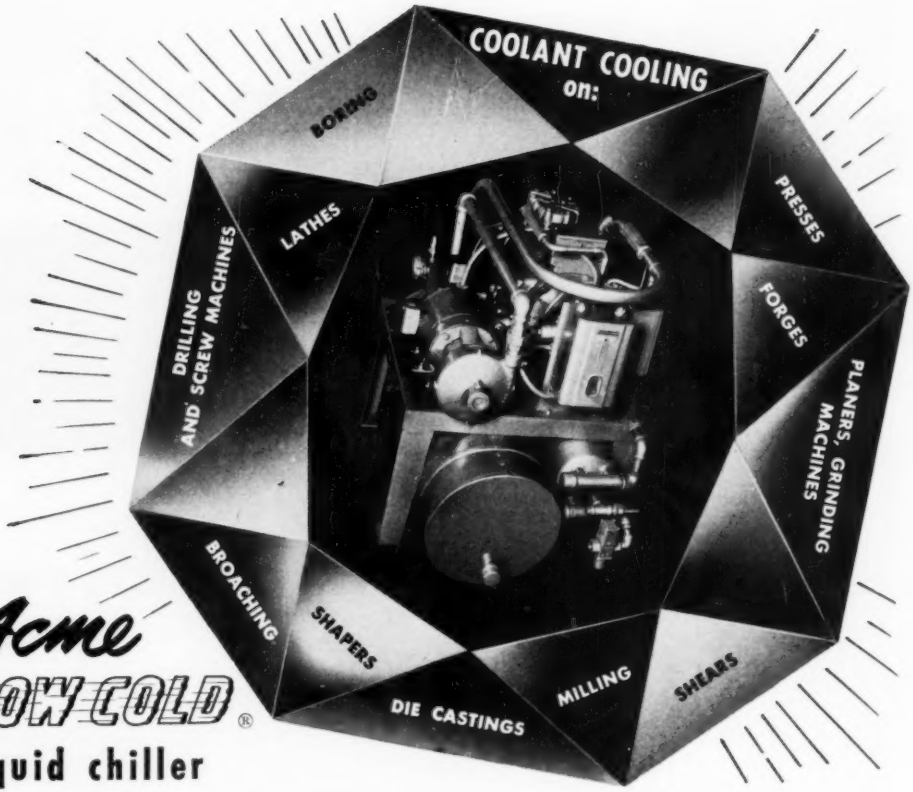
DIVISION OF THE NATIONAL SUPPLY COMPANY

General Sales Office: Pittsburgh 30, Pa. District Sales Offices: Atlanta, Boston, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis



Acme FLOW COLD® liquid chiller

. . . a "jewel" of many facets

Just as the many facets on a perfect diamond are mute testimony to the diamond cutter's skill, so are the many applications of the Flow Cold unit testimony of the skill of ACME design engineers. Wherever you need to maintain temperatures of coolants for any industrial process, the Flow Cold unit is easily adapted. Gives you exact temperature control which means uniform production quality and maintenance of closer tolerances. Can also be applied to the maintenance of solution temperatures in plating, anodizing and welding processes. Increase production quantity and quality through the use of Flow Cold. Moreover, it is the perfect chilling unit for central drinking water systems, and for home, office, or business air conditioning. Write us today!

FLOW COLD UNITS...

- ★ are self contained
- ★ are compact
- ★ are easy to install
- ★ are factory tested and assembled
- ★ are economical
- ★ are efficient
- ★ come in 6 models — 2 to 15 H. P.

ACME also manufactures:

Dry-Ex* Water Chillers, Hi Peak* Water Coolers, evaporative condensers, shell and coil and shell and tube condensers, fin coils, cooling towers, oil separators, liquid receivers, heat exchangers. Write us today for any information you desire about the Flow Cold unit, or about any of the other articles we manufacture.

*Trade Mark

ACME INDUSTRIES, INC., Jackson, Mich.

Flow Cold Division

CONTINUOUSLY SERVING THE AIR CONDITIONING AND REFRIGERATION INDUSTRY SINCE 1919

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Serving home and industry

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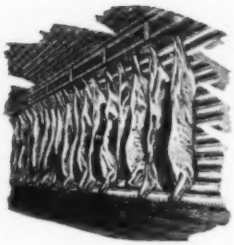
in the Refrigeration Industry



W-S FORGED STEEL FITTINGS

Screw-End and Socket-Weld Types

Since Watson-Stillman engineers first developed their special line of forged steel fittings to meet the service conditions of the Refrigeration Industry, the W-S double-diamond trade-marked fitting has been identified with longer, more dependable life and lowest per-year cost in all phases of the industry's operations.

Precision-machined from solid drop-forged steel bodies, Watson-Stillman fittings are much less subject to unscheduled outages than fittings made from other materials or by other methods of fabrication. Being stronger, they are much smaller and lighter . . . bringing economies in weight and space all the way down the line. Their denser, tougher metallic structure is more resistant to corrosion, vibration, shock, and all types of stresses—including internal pressure and creep—than other types.

Yes, there are many reasons why W-S double-diamond fittings are preferred by *all* industries. Want more information? See your Watson-Stillman distributor or write direct.

• Stronger • Smaller • Lighter • Tighter
• More Uniform • Lower Service Cost

SOLD THROUGH LEADING DISTRIBUTORS . . . EVERYWHERE

9-M-4

WATSON-STILLMAN
ESTABLISHED 1848

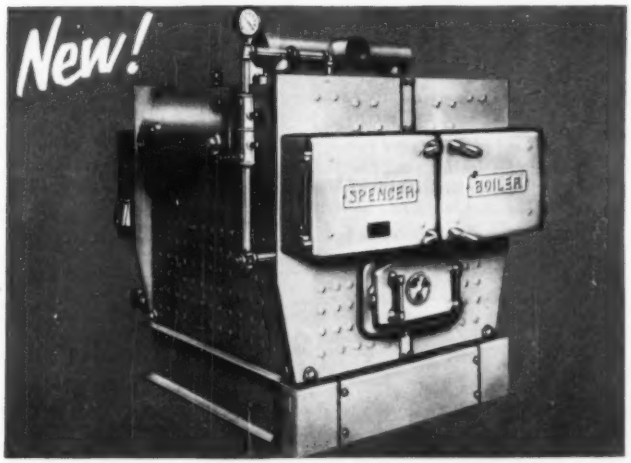
DISTRIBUTOR PRODUCTS DIVISION
ROSELLE, NEW JERSEY

Designers and Manufacturers of Forged Steel Fittings, Hand Pumps, Jacks, Wire Rope Shears, Pipe Benders and Hydraulic Equipment

Let SPENCER Solve Your Heating Problems

with a wide selection of boilers in more than 70 adaptable models and sizes. There's a Spencer for every building... for every fuel!

IN THE COMMERCIAL FIELD, Spencer offers an ingenious new design like this—



SPENCER'S
NEW DIVIDED LOW-WATERLINE BOILER

Flattened out to beat low headroom problem!

Divided for easier entrance through basement openings. Yet two watertight sections need no welding for installation!

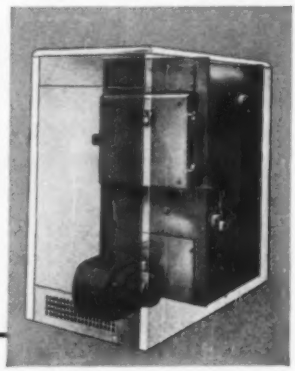
This and other Spencer commercial boilers range in size from 3,500 to 42,500 square feet, steam.

IN THE RESIDENTIAL FIELD, Spencer offers versatile lines like these—

SPENCER'S "C" SERIES—Modern steel heating boiler—smartly styled jacket, standard or extended—9 sizes ranging from 570 to 3000 sq. ft., steam—three-pass type boiler—heavy-duty doors—water-cooled frames.

SPENCER "R" SERIES—Steel heating boiler—6 sizes ranging from 320 to 1100 sq. ft., steam—peaked firebox for more efficient combustion—staggered boiler tubes for quick heat transfer—comes in standard or extended beauty jacket.

SPENCER HEATER
LYCOMING-SPENCER DIVISION
WILLIAMSPORT PENNSYLVANIA



HITCH YOUR WAGON TO THIS STAR...bryant

See what you get

IN THE SENSATIONAL

bryant "327" unit heater

NOW AVAILABLE IN ALL POPULAR SIZES

FREE FOR THE ASKING! Call your Bryant distributor for your copy of this 20 page fully illustrated book which provides you with much helpful information on specifying, installing and properly locating unit heaters. This comprehensive booklet has been designed to help you.

Sets NEW Standards in...

Quiet Operation . . . NO narrow passages to cause whistling . . . it's open, streamlined—efficiently designed to HUSH the air flowing through.

Compact . . . the "327" installs within inches of ceiling, saving space. It's lighter, easier to handle, easier to install.

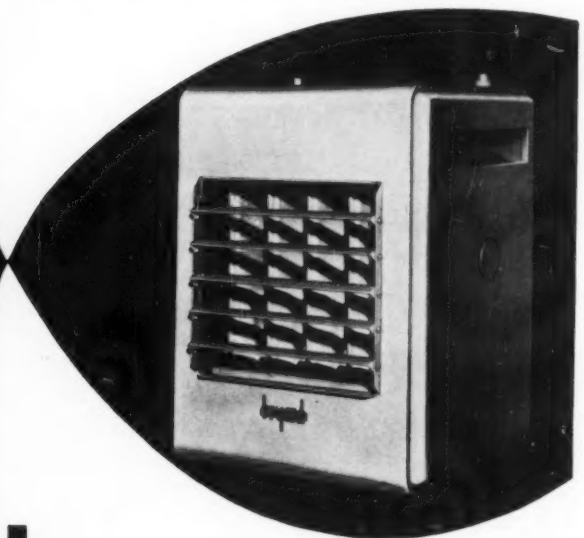
Comfort . . . no cold blasts at start of cycle. Fan won't start until the heat exchanger is warm enough to assure comforting heat.

Long, Trouble-free Performance . . . the "327" retains its high efficiency for life. Efficient Venturi tubes provide longer, trouble-free service, less heat loss up the flue.

Extra-sensitive Controls . . . responsive low-voltage controls mean better, more uniform heat. Safety controls prevent overheating.

Quick, Easy Servicing . . . easy-open access panel at bottom permits cleaning and servicing without removing unit.

Yes, the revolutionary Bryant "327" opens up hundreds of new unit heater sales for you. See your Bryant distributor today or write Bryant Heater Division, Affiliated Gas Equipment, Inc., Dept. 128, 17825 St. Clair Ave., Cleveland 10, Ohio.



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BEST BUY IN...

HEATING
AIR CONDITIONING
WATER HEATING

Chosen for the World's Largest Airport Building

GREATER PITTSBURGH AIRPORT

BRIEFING

Consulting Engineer
Theodore F. Rockwell
Century Building
Pittsburgh, Penna.

Heating Contractor
McGinness, Smith & McGinness
527 First Avenue
Pittsburgh, Penna.

190 ANDERSON STEAM TRAPS
183 ANDERSON STRAINERS
62 AIR RELEASE VALVES

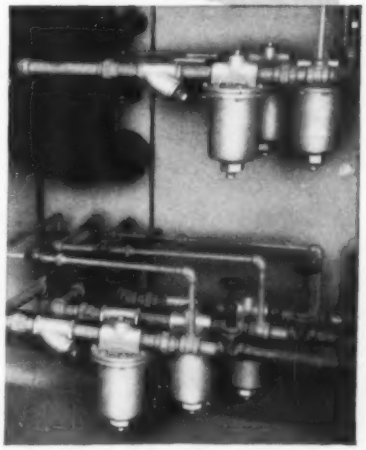
Where speed of installation and servicing, as well as absolute dependability, are prerequisites, Super-Silvertop Steam Traps get the nod! Chosen for the Greater Pittsburgh Airport, Super-Silvertops offer these outstanding features.

1 Super-Silvertops are installed quickly straight-in-line as seen in the photo at the right . . . or as an elbow. Saves time. Saves fittings. Saves money.

2 Look at the photo again. See how you can take a Super-Silvertop apart for inspection and replacing of valve and seat without disturbing the pipeline in any way. Another Super-Silvertop money-saving feature.

3 Inside the trap a patented guided bucket protects the bucket . . . this plus an exclusive Anderloy valve and seat makes the trap last years longer.

You'll make a perfect landing every time you specify and install Super-Silvertops. Do it on your next job.

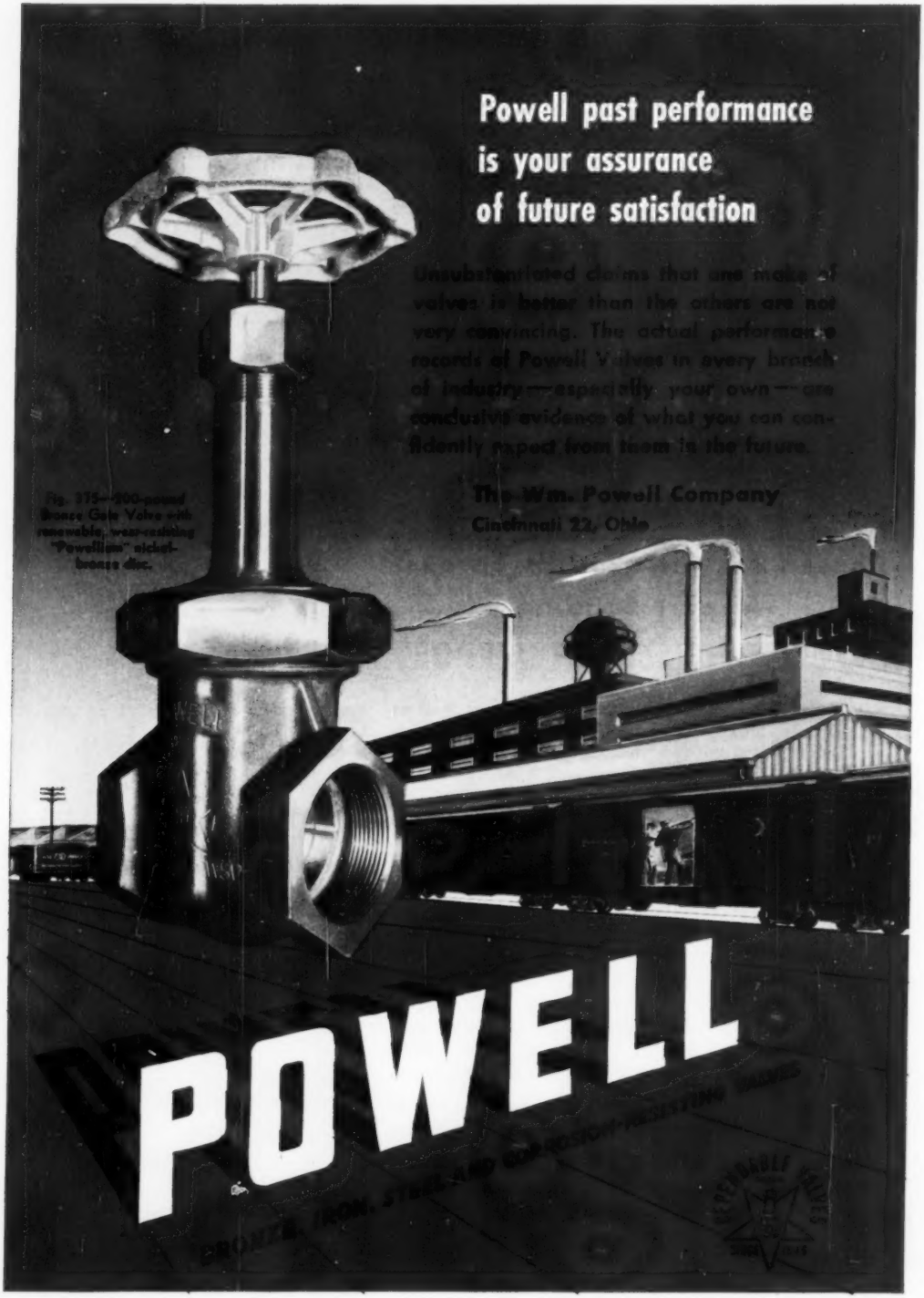


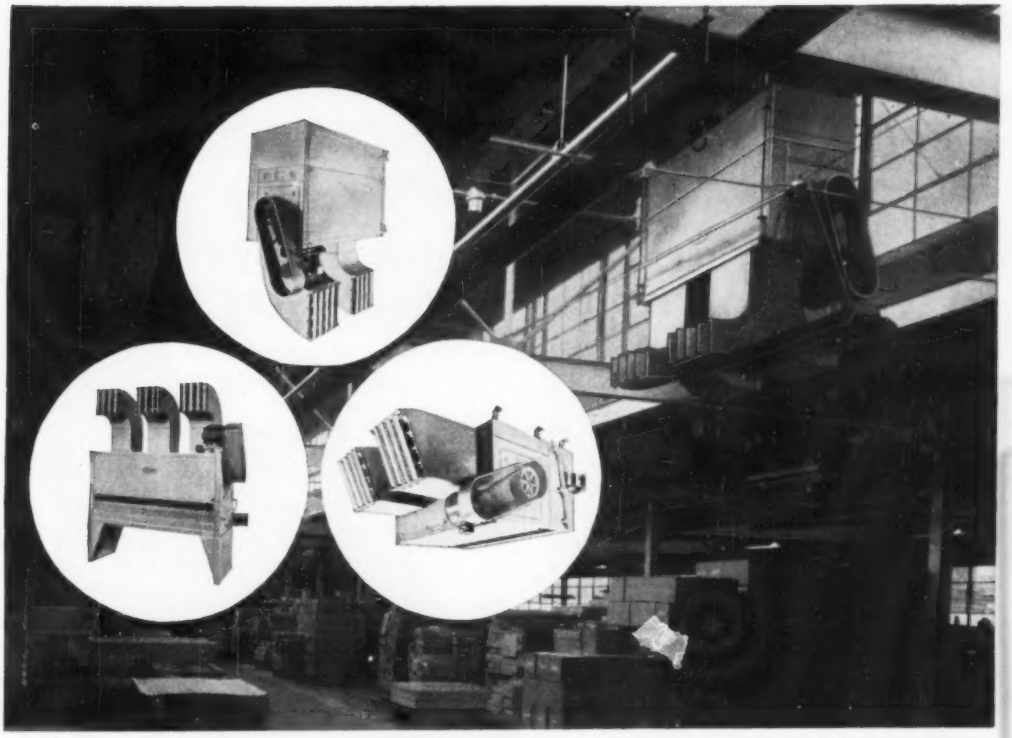
Super-Silvertop Steam Traps help keep parked airplanes comfortable. The new airport has a central heating and air-conditioning system which connects by hose to standing aircraft.

THE V. D. ANDERSON COMPANY
1949 West 96th Street • Cleveland 2, Ohio

THE TRAP THAT'S INSTALLED STRAIGHT-IN-LINE OR AS AN ELBOW

See our exhibit booths 83 and 84 at the 20th National Exposition of Power and Mechanical Engineering


Powell past performance
is your assurance
of future satisfaction
Unsubstantiated claims that one make of valves is better than the others are not very convincing. The actual performance records of Powell Valves in every branch of industry—especially your own—are conclusive evidence of what you can confidently expect from them in the future.
The Wm. Powell Company
Cincinnati 22, Ohio
No. 375—300-pound Bronze Gate Valve with renewable, wear-resisting "Powellium" nickel-bronze disc.
POWELL



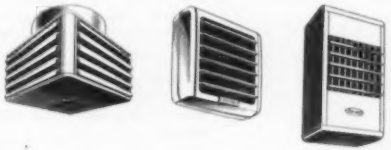
I. S. Berlin Press finds Carrier gives better heat for bigger buildings

It's the larger spaces that put heating units to a real test. That's why the I. S. Berlin Press, 3201 N. Kimball Ave., Chicago, relies on Carrier blower-type Heat Diffusers to heat their warehouse. Cold floors and drafty corners are never around in even the biggest warehouses, hangars, factories or garages with Carrier Heat Diffusers on the job. They bring in fresh outside air, warm it quickly and evenly, and send it to every cranny of the building through multiple discharge outlets with adjustable louvers.

Famous Aerofin coils for steam or hot water, as used in all Carrier Heat Diffusers, are available in either U-bend or Non-Freeze type. When Aerofin Non-Freeze coils are used, there's no need to install low limit protective controls or to temper outside air, because these coils just *will not freeze*, even when handling 100% outside air at below freezing temperature!

Another advantage: Carrier Heat Diffusers are of sectionalized construction, easily installed, and can be readily rearranged for floor, wall or ceiling mounting.

For steam or hot water Carrier blower-type Heat Diffuser models 46P, Q, R are available in 6 sizes, to 2,390,000 Btu's per hr. at 2-lb. steam. Air-handling capacities to 31,000 cfm. Write for our informative catalog, "Carrier Heat Diffusers." Carrier Corporation, Syracuse, New York.



For smaller spaces, Carrier propeller-fan type Unit Heaters: Four-way Directed-flo vertical discharge model 46S (left), 7 sizes, 82,000 to 500,000 Btu's, for steam or hot water; horizontal discharge model 46U (center), 10 sizes, 21,000 to 200,000 Btu's, for steam or hot water; and gas-fired model 46T (right) and 46TD (duct type, not shown), 7 sizes, 70,000 to 230,000 Btu's, AGA-approved for all gases.

Carrier

Air Conditioning • Refrigeration • Industrial Heating

STEAM POWER
for Kaiser Aluminum

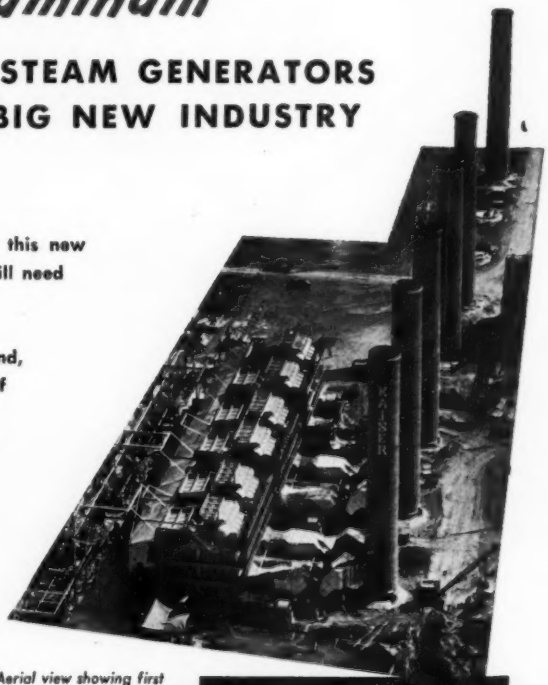
15 FOSTER WHEELER STEAM GENERATORS SERVE THE SOUTH'S BIG NEW INDUSTRY AT CHALMETTE, LA.

For every pound of aluminum produced in this new 400,000,000 pound-per-year plant, Kaiser will need about 10 kwh of electric power.

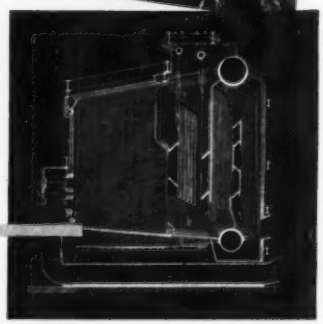
To meet this enormous, almost constant demand, Kaiser Engineers selected a plant consisting of gas-burning radial engines, and 15 Foster Wheeler "D" type boilers to supply steam for the turbine-generators.

These boilers, with a combined capacity of 3,375,000 lb of steam per hr, are ideally suited for Kaiser's requirements for reliability, ease of operation and high availability. And they are a natural for use in the South where a temperate climate permits low-cost, semi-outdoor-type installations.

This installation is another example of Foster Wheeler's ability to design and construct power-producing equipment to meet the needs of industry.



Aerial view showing first six boilers and six of the eight stacks under construction. Nine more boilers, now being fabricated, will be located in extension of the present line. Turbine room is to the left.



Cross-section of one of the 15 duplicate Foster Wheeler "D" type steam generators for Kaiser Aluminum. The regenerative air heater is not shown.

CAPACITY	225,000 lb per hr
PRESSURE	900 psig
FINAL STEAM TEMPERATURE	905 F
TEMPERATURE FEEDWATER INLET	350 F
FIRING	Natural Gas

For information on your steam generation requirements, write to: FOSTER WHEELER CORPORATION, 165 BROADWAY, NEW YORK 6, NEW YORK

FOSTER WHEELER

"...costs more, AND WORTH IT!"

Grant Wilson

DUX-SULATION

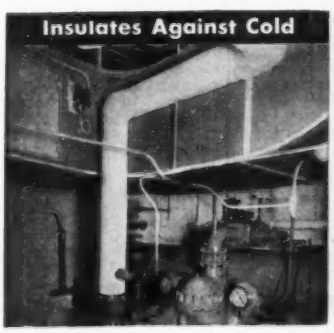
(ASBESTOS-PROTECTED)

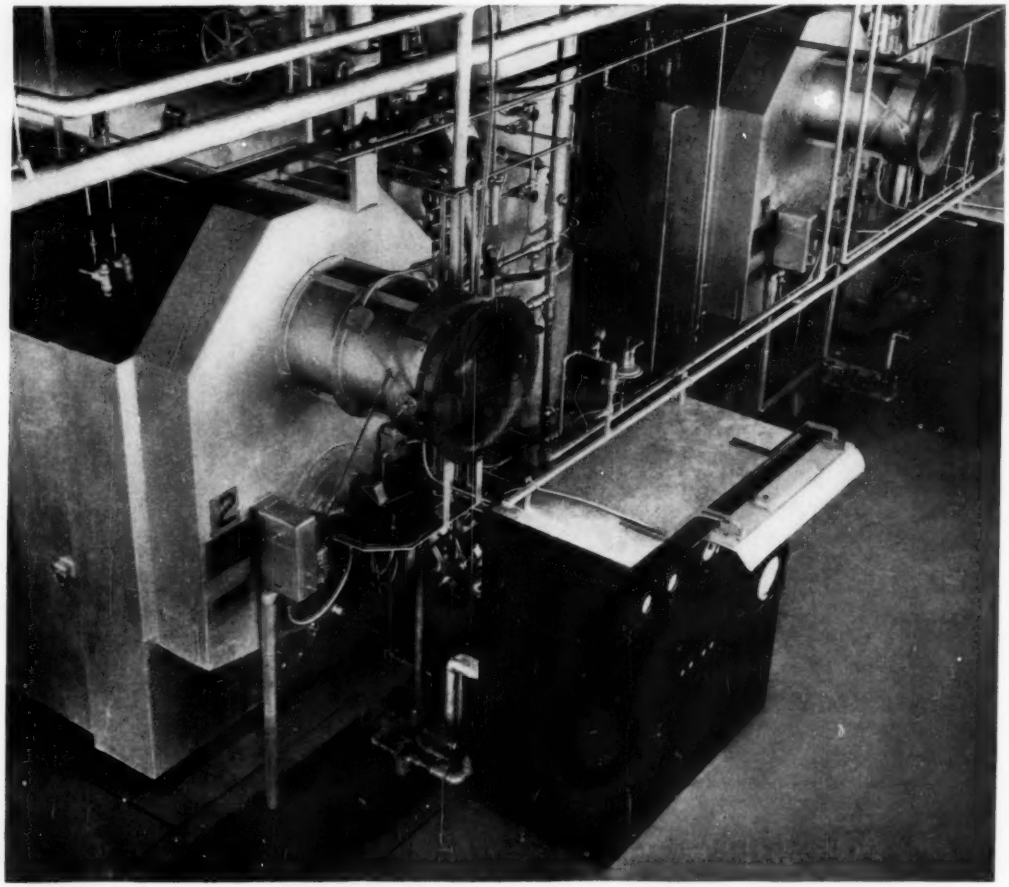
The initial cost of **DUX-SULATION** may be higher — but by the time a good job is completed you have the **BEST** Thermal/Acoustical Duct Insulation possible. It's worth more because:

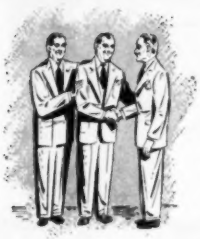
1. Comes complete with adhesive and tape — there are no extras to buy.
2. It permanently maintains its original specified thickness — even at the corners and joints.
3. Its application is fast, simple and secure. It is ideal for application on (inside or outside) round, rectangular or irregular shaped duct-work.
4. **DUX-SULATION** will not mat down, sift, crumble, powder or shift. It can be installed in the shop or on the job because it's stronger and tougher. It's non-irritating.

You will want to see and feel the superior construction of Asbestos-Protected **DUX-SULATION**. So write for a free sample today. Then you will know why it's worth more and why you can specify it with confidence.

Write to: ***GRANT WILSON INCORPORATED***
BOARD OF TRADE — SUITE 1560B
CHICAGO 4, ILLINOIS







Popular Choice
for "Packaged" Steam

- Saves Erection Time and Cost
- Meets Wide Range of Service
- Handles Quick Load Changes
- Fast Steaming
- Low Maintenance
- Easy Accessibility
- Suitable for Outdoor Service
- Burns Oil and/or Gas
- Saves Fuel
- Saves Space
- Safe, Automatic Operation

The shop-assembled B&W Integral-Furnace Boiler, Type FM, has gained industry-wide acceptance. Prominent companies in over 50 different industries, along with numerous utilities, educational institutions, hotels, hospitals, housing projects, office buildings, and government agencies have already selected this compact, self-contained steam generating unit for installations in 34 states, three U. S. territories and five foreign countries. Total steam capacity of units now in service and on order exceeds 5½ million pounds per hour. Nearly half of this capacity consists of multiple-unit applications of FM boilers instead of single larger-capacity units.

This recent B&W creation in low-cost steam generation is available in standardized sizes for loads of 2900 to 28,000 lb per hr at steam pressures to 250 psi.

Send for Bulletin G-76 describing and illustrating the many cost-saving features of this popular boiler. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd St., New York 17, N. Y.

BABCOCK & WILCOX

G-573

THE EDITOR'S PAGES

HOW TO MAKE editors happy: One of HPAC's readers, who commutes daily to and from his office, has just told us that on two recent occasions he's ridden past his station because he was so absorbed in reading this magazine. We're sorry he was inconvenienced, but we hope it happens frequently. We've offered to pay his cab fare back to where he wants to go the next time.

HPAC'S READERS HAVE SHARP EYES

SHARP EYES—and a good knowledge of history—are among the many outstanding characteristics of HPAC's readers.

An advertisement for Wheatland Steel Products Co. in our July issue erroneously said that Commodore Perry (rather than Commodore James Lawrence) said "Don't give up the ship" way back in 1813. Wheatland and its advertising agency, Leonard F. Fellman and Associates, let the error go through to see how closely the advertisement in Heating, Piping & Air Conditioning would be read.

More than 50 of HPAC's readers wrote in about it during the first month after its appearance in our pages.

DEPRECIATION RATES FOR AIR CONDITIONING

IN THE ARTICLE on owning and operating costs of heating, ventilating and air conditioning systems in large buildings published in the October HPAC, it was pointed out that the depreciation rate set by the internal revenue bureau on air conditioning equipment is 6 2/3 percent on a 15 year basis.

Bulletin "F", issued by the bureau for the guidance of taxpayers and officers of the bureau in regard to depreciation problems, indicates that small air conditioning systems under 5 tons have an average useful life of 10 years, that medium systems of 5 to 15 tons have a life of 15 years, and that large installations of over 20 tons have a life of 20 years.

Thus, the statement in the article was correct only in a general way with respect to the average useful life of a medium size system. It should also be noted that the information in bulletin "F" is not used as the sole basis for reaching a conclusion in any case, since the estimated useful lives and rates of depreciation used therein are based on averages. The correct rates in a particular case must be determined in the light of the experience of the property under consideration and all other pertinent evidence.

ELECTRICAL MEN CONFER ON AIR CONDITIONING, HEAT PUMP

NO OTHER INDUSTRY is going to affect our daily living in the next 15 to 20 years as much as is air conditioning, predicted A. B. Newton, vice president of Acme Industries, Inc., at an electrical modernization conference sponsored recently by the Chicago Lighting Institute. There was a "terrific increase" in air conditioning installations this year in many parts of the country, he said, and he foresaw continued growth.

Many older buildings are not wired adequately for a proper job of air conditioning, he warned, and in some cities electrical distribution systems present a problem. In other cities, generating facilities need modernization. Electrical peak loads occur in some areas in August rather than during the winter because of air conditioning, he stated.

He mentioned that automotive air conditioning will be sold widely for the first time next year.

At the same conference, G. Gill Freyder, of the Commonwealth Edison Co., described the uses and possibilities of the heat pump, or reversed refrigeration cycle, which he said represents a "very attractive" load for the electric utility.

He described briefly a recent heat pump installation in the Chicago area for a plant making small precision parts and requiring a 75 F temperature the year around. The cooling load totals 30 tons, which is handled by two 20 ton refrigerating machines. In summer the coils are used as air cooled condensers (city water is not available, and driving a well would have been expensive) and in winter the coils pick up heat from the outdoor air. This heat picked up from the outdoor air is of course increased in temperature level by the heat pump cycle for use in heating the building.

According to Mr. Freyder, the cost of the heat pump installation was under $28,000 — which compared favorably with a conventional heating and air conditioning system. The cost of operation is comparable to a conventional installation, he said.

Mr. Freyder stressed also the advantages of heating domestic hot water by the heat pump, and said that such units also provide basement dehumidification. He felt that the cost of a heat pump water heater would be about the same as the cost of a more conventional type of water heater plus a basement dehumidifier.

HEATING JOBBER DELIVERS BY HELICOPTER

EDWARD M. MORAN, of the Moran Supply Co., Chicago, inaugurated last month emergency deliveries of heating equipment by helicopter to hospitals, defense plants, homes for orphans and the aged, and other institutions in the Chicago area.

The service is aimed primarily to supply smaller towns within a radius of 150 miles of the city, where local stocks are not large.

Moran Supply Co. is a distributor for Burnham Corp., Bell & Gossett Co., A. W. Cash Valve Mfg. Co., Dole Valve Co., General Filters, Inc., Hoffman Specialty Co., Kainer & Co., Kewanee-Ross Corp., Jas. P. Marsh Corp., McDonnell & Miller, Inc., Minneapolis-Honeywell, Walworth Co., White-Rodgers, and Youngstown Sheet & Tube.

FIRST SHIPMENT by helicopter is handed to pilot George Snyder by Mr. Moran

CAN I BE AN ENGINEER?

A NEW BOOKLET, entitled Can I Be an Engineer?, is part of General Motors campaign to alleviate the shortage of engineers.

It is aimed at the student in his early years at high school, and attempts to interest him in engineering and in taking the proper high school subjects to prepare him for an engineering course in college.

Distribution of the booklet is being made to superintendents, high school principals and other educators. Copies are available from the Department of Public Relations, General Motors, Detroit 2.

REFRIGERATION, A.C. FOR DEFENSE BEING STUDIED

A PROGRAM TO standardize components of refrigeration and air conditioning equipment used by the Department of Defense has been undertaken by the Defense Supply Management Agency of the Department of Defense with the support of the refrigeration industry.

A Munitions Board Industry Advisory Committee, composed of representatives of eleven manufacturers of such equipment selected to reflect a cross-section of the industry by size of company, is collecting data necessary to complete the work. A subcommittee is considering the particular problem of compressors.

The committee will develop plans for reducing the number of types of refrigeration and air conditioning units used by the three military departments to attain the maximum practicable interchangeability of parts and components.

Ultimate objective of the standardization effort is to simplify spare parts supply and maintenance in order to increase efficiency and effectiveness of military supporting services to combat areas.

Members of the main committee are Donald French, Carrier Corp.; B. S. Booher, General Motors Corp.; L. W. Larsen, Tecumseh Products Co.; R. F. Lauer, York Corp.; J. L. Ditzler, Westinghouse Corp.; C. L. Coulter, Lehigh Mfg. Co.; Clyde Ploeger, Servel, Inc.; S. D. Loveley, Chrysler Corp.; Oscar Buschman, Copeland Refrigeration Corp.; Frank Hawk, Brunner Mfg. Co.; and K. A. Gould, General Machine and Mfg. Co.

Rear Admiral J. W. Fowler, USN, (Ret), Director of the Defense Supply Management Agency, is chairman; Nathan Brodsky, Deputy Director of the Defense Supply Management Agency, is deputy chairman, and Kenneth A. Simmons, Office of Standardization, Defense Supply Management Agency, is government liaison representative.

Consultants, Inc., 734 Jackson Pl., N.W., Washington 6, D.C., of which T. H. Urdahl is president, has been engaged in making a factual survey and study of requirements of the military agencies and the products of the industry, as a basis for standardization for interchangeability and its possible limitations.

"QUOTE"

"In justification of my talk this evening, let me say that much of it I didn't prepare myself."—*Speaker at a recent engineering meeting.*

MINARD SEES INCREASING AIR CONDITIONING SALES

POTENTIAL SALES OF the Trane Co. should increase $12 to $15 million in the next three to four years, D. C. Minard, president, told the New York Society of Security Analysts in a recent address.

Factors contributing to a one-third increase in the potential available to the company, according to Mr. Minard, include new product developments in air conditioning, heating, heat exchange and refrigeration equipment, and increased penetration of markets the company has entered in the past two years. These new lines will give the company an opportunity to maintain its present volume even in the event of a substantial decline in new construction, Mr. Minard said.

Mr. Minard pointed out that in the industrial and processing fields there are literally hundreds of heat exchange and cooling applications coming into prominence. More and more, manufacturers are finding that to meet competition, or to increase output, or to make many processes even possible, air conditioning in one form or another is close to a necessity.

Expanding markets such as these make the air conditioning field quite an attractive one, he said. Competition is intense in the industry, and there is no easy, quick way to make a so-called killing in the air conditioning industry, in his opinion.

It does seem clear that the industry holds great promise because the American people surely will want the comforts of air conditioning in all types of buildings. Also, more and more processes, to be successful or to be competitive, require temperature and humidity control. It seems, then, that if management can be alert to the broadening markets available, and have a progressive, experienced point of view in marketing, in design engineering, and in application engineering, there is great opportunity in the air conditioning and heat exchange business, he concluded.

NPA PIPING COMMITTEE RECOMMENDS STANDARDS

RETENTION OF MATERIALS controls was favored by the Fabricated Metal Piping Industry committee at a recent meeting, but members asked that NPA devise ways and means through which the industry might be assured of an adequate supply of materials for important construction.

The industry does not manufacture pipe, but is engaged in welding, bending, and fitting to blueprint specifications set by the Atomic Energy Commission, electric and steam power industries, petroleum refining and cracking plants, chemical concerns, and others using process piping.

The major problem in the industry, according to the committee, is shortage of welding rods, some companies reporting backlog orders which they cannot fill for 18 months.

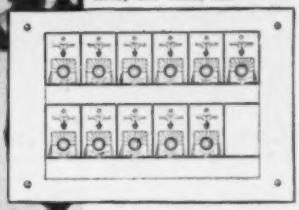
The committee recommended:

1) That a special conference be held to discuss further standardization of heavy wall pipe in sizes ranging from 8⅝ to 16 in.

NPA agreed to such a conference in the hope that the session will result in fabricators being assisted in placing orders with mills through standardization of sizes which would benefit mills, fabricators, and end users.

2) Extension, within the industry, of rules on the self-certification of materials, to permit any company within the industry to self-certify an amount of material within any quarter-year equal to that allotted in the previous quarter.

The Travelers Insurance Co. Buildings, Hartford, Conn. Architects: Voorhees, Walker, Foley & Smith. Consulting Engineers: Meyer, Strong and Jones. Heating Contractor: Libby and Blinn, Inc.



This 11-zone panel centralizes control at one point. Any zone may be (a) shut off, (b) put on automatic or (c) put in heating-up position from this point. Rate of heat to any zone may be speeded up or slowed down in comparison with the normal supply as indicated by Outdoor Thermostat control.

Heating Modernization Program Pays The Travelers Insurance Company

The original home office building of The Travelers Insurance Company was built in 1906. As The Travelers grew, additional office space was provided by new buildings erected in 1912, 1918 (the Tower building), 1921 (the building in center foreground), 1926, 1928 (the large rectangular building at right), 1938 and 1939, bringing the total floor area occupied by the Company to 1,012,834 square feet.

In 1944, 38 years after the original heating installation, The Travelers asked their architects to recommend the changes necessary for modern heating with two objectives—minimum fuel cost and complete comfort for all employees.

After careful study, the following were approved: (1) four new oil-fired water-tube boilers with automatic combustion control, each boiler having a capacity of 25,000 lbs. of steam per hour, (2) a smaller water-tube boiler for heating domestic hot water in the summer months, new vacuum pumps and related boiler-room equipment, (3) improvements to the existing ventilation system, (4) a Webster Moderator System of Steam Heating for "Controlled-by-the-Weather" economy.

By 1948, when the modernization program was completed, heating service was noticeably improved. Employee comfort was definitely improved as chronic heating complaints had been eliminated. Labor costs were reduced.

Actual fuel savings of approximately 40% were indicated by a comparison of heating costs between the operation of the old coal fired plant and heating system, and the new boiler plant along with the new Moderator controlled heating of the buildings.

Here is evidence that well-planned heating modernization programs pay big dividends in improved heating service and lower fuel costs. If you are planning the heating for a new building or modernization of an existing building, the Webster Moderator System belongs in your plans.

There are Webster representatives in 65 principal cities working with architects, engineers and heating contractors in the application of Webster Systems and Equipment. Call your Webster representative or write us for his name.

Address Dept. HP-11

WARREN WEBSTER & CO.

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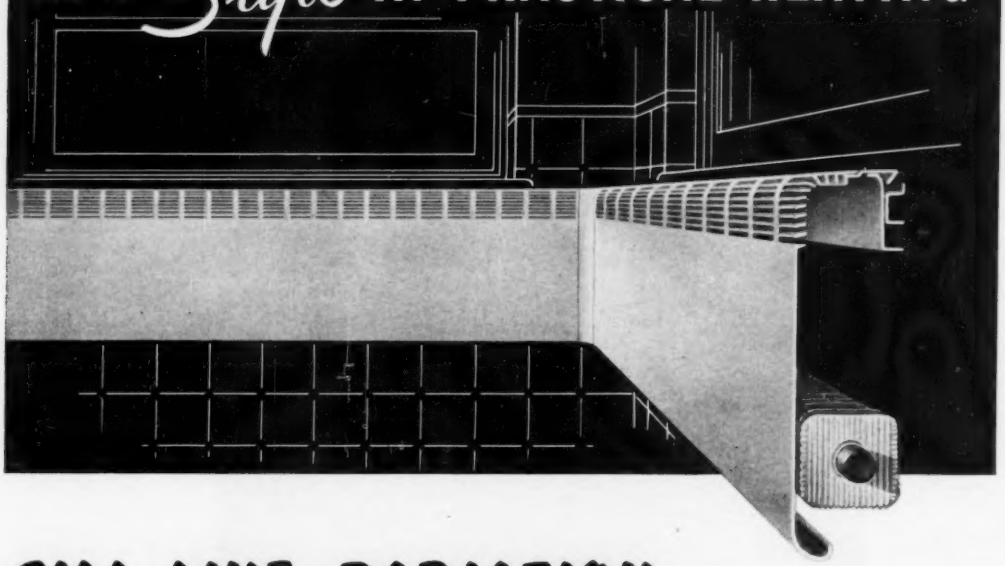
WEBSTER
MODERATOR
SYSTEM
OF STEAM HEATING
"Controlled by the weather"

NEW *Style* IN PRACTICAL HEATING



SILL-LINE RADIATION

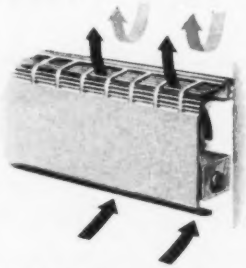
...now combines every comfort of high-capacity heating with the beauty of enclosure styling

For the first time, under-the-window wall-fin radiation is offered in an attractive rigid enclosure expressly designed for use where appearance is important. Flowing lines harmonize with modern surroundings, permit full usability of the space heated.

The new *stylized* Sill-line Radiation retains all the practical advantages of quick, uniform, perimeter heating; economy of operation; ease of installation; and flexibility. But it does more. It blends beauty with utility in full compliance with present architectural trends for hospitals, schools, apartments, office buildings, showrooms.

Go modern with Nesbitt Sill-line. Available in three enclosure sizes in nine modular lengths; two fin sizes for single row or double tierings; wide range of capacities. Investigate today.

Convected air currents enter at the casing bottom, are warmed by the heating element, and leave through the top grille. This activates warmed-air circulation from floor to ceiling and overcomes cold window downdrafts.



The warmed enclosure provides a radiant heating effect to further insure the comfort of occupants in the vicinity of the exposed walls and windows.

Send for Nesbitt Sill-line Publication 271

MADE BY JOHN J. NESBITT INCORPORATED, PHILADELPHIA 36, PENNSYLVANIA

"OPEN FOR DISCUSSION"

We follow here each month the practice at engineering society meetings of providing an "open for discussion" period. You are urged to participate. Address your comments to the Editors, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2.

DOES SCHOOL PLANT HAVE ENOUGH OIL STORAGE?

I AM CONSISTENTLY engaged in the design of mechanical systems for school buildings. Therefore, I was duly interested in the article in the August HPAC entitled Heating and Ventilating Chicago's Hale Branch School.

In general, the job described appears to be soundly engineered; however, there is one item that leaves me cold, and I believe might cause the building to be left cold, too.

I noticed that there is provision, according to the boiler room plan, for only 550 gal of fuel oil storage. Assuming from the size of the plant that the annual fuel oil consumption might approximate 30,000 gal, deliveries to replenish the tanks would have to be made 60 times a year. With this storage capacity, it is likely that during the coldest weather, deliveries would have to be made daily. I immediately wondered about a relatively short delay in delivery and the possibility of the plant being without fuel.

Perhaps there is other provision for fuel storage, but it is not indicated on the boiler room plan.

I am wondering what basis was used for determining the fuel storage capacity.—E. J. HUSARIK, E. R. Gritschke and Associates, Consulting Engineers.

REPLY BY THE AUTHOR — Our normal daily operating period is from 9 a.m. to 3 p.m., plus a warmup period which from our experience never exceeds 2 hr — making the total daily operating period of 8 hr.

The total heating and ventilating load, when the outside temperature is −10 F and the inside temperature is 70 F, and the plant is using 100 percent outside air with no recirculation, is 41.2 boiler hp.

Using these two severe conditions to determine the amount of storage needed for one week's (5 days) fuel supply — our minimum storage requirement — we obtain 472 gal, based on our guaranteed boiler efficiency of 80 percent and a heat content of 146,000 Btu per gal for No. 5 fuel oil.

However, in the third school of this type to be designed, the storage capacity was increased to 1000 gal because of purchasing difficulties.—JOSEPH L. FATZ, JR., Mechanical Engineer, Chicago Board of Education.

OPERATING AIR CONDITIONING DURING EXTREME WEATHER

I HAVE READ THE article by H. G. Gregerson, How Does a Heat Wave Affect Air Conditioning?, published in the October HPAC. He reports generally what is expected during such a condition. However, one statement aroused my curiosity and that is the fact that condensation occurred on the ducts with an office building air conditioning system operating all night in extreme weather.

Our experience has been just the reverse. With systems shut down at five o'clock in the evening, the fans are generally run for the benefit of the cleaning crews and damp outside air is brought into the building. When the system is started in the morning, considerable moisture has to be removed in the conditioned spaces. In fact, some of the rubber tile in corridors and rooms has come loose because of repeated drying and wetting due to changes in humidity. If the fans are stopped when the refrigeration is shut off, or the outdoor air dampers are closed, this situation is cleared up. We have never had any trouble with systems operated 24 hr per day.—R. J. SALINGER, Associate; Office of Reg. F. Taylor, Consulting Engineer.

REPLY BY THE AUTHOR — I am not sure that I understand Mr. Salinger's explanation of operating conditions as he has found them in buildings in Houston, so I will confine myself to a further explanation of conditions we have encountered.

In two different buildings in which an attempt was made to beat the heat by running the air conditioning equipment all night, both the fans and the refrigerating machines were allowed to run. With a very light load on the equipment, the temperatures in the spaces would be kept as low as the thermostats would allow them to be. With outdoor temperatures and return air temperatures at a minimum, the air off the coils would be possibly 5 to 10 deg lower than usual. These unusually cold temperatures reduced the flanges of the ducts to a temperature below that of the air — and condensation resulted.

It was not necessary to run the equipment all night in either building and when this was stopped, the sweating on the ducts stopped. The leaving air from the cooling coils under normal conditions is such that the duct flanges do not sweat.—H. G. GREGERSON, George L. Dahl Architects & Engineers.

FURTHER COMMENT BY MR. SALINGER — I can now understand the difference in conditions in our jobs and those referred to in Mr. Gregerson's article. We always recommend insulated ducts above furred ceilings in office buildings in order to prevent sweating when the system starts up in the morning after a weekend shutdown. Another method of preventing sweating with uninsulated ducts would be to close the outdoor air inlets and merely recirculate the air. We think that the damp night air may have a lot to do with the condition.

Controls would have to be used to keep the leaving air temperature from going below the average dew point in the space.—R. J. SALINGER.

SERVICE CALLS INCREASE IN HOT WEATHER

WE BELIEVE THAT the article on how a heat wave affects air conditioning, by H. G. Gregerson, published in the October HPAC, is a very good one, and we agree with the points made in it.

However, our experience does not substantiate statements claimed to

have been made by several engineers that service work is less during the periods of maximum outdoor temperatures. Our service calls to check refrigeration equipment show a considerable increase during the hot summer months of calls originating from the servicemen in the field.

Insofar as a compressor is concerned, it may be true that it is less likely to need service during periods of weather causing continuous operation, but the possibility of service calls due to failure of motors and component parts is greatly increased. —G. E. MAY, Assistant Chief Engineer, New Orleans Public Service, Inc.

REPLY BY THE AUTHOR — I have no comment to make, except to inquire whether or not the refrigeration equipment mentioned is for air conditioning or for display cases, walk-in coolers, etc. I am sure that the service work required for refrigeration equipment for such purposes is in direct proportion to the outdoor temperature. Generally speaking, these units are not attended as much as is air conditioning equipment and, therefore, are more prone to failure. Also, I believe that the compressors will be operating at higher suction pressures with attendant increases in head pressure and power consumption, such that the equipment is under a greater strain. In air conditioning work, assuming that the equipment is adequate, the suction pressures will not rise above the original design.

The people with whom I checked for the information in my article are some of the larger concerns doing air conditioning work.—H. G. GREGERSON, George L. Dahl Architects & Engineers.

"Good architecture is good engineering neatly plastered over"

—Quoted by S. Alan Baird, Consulting Engineer, at a meeting of the Illinois chapter of the ASHVE.

QUESTIONS METHOD OF INSTALLING HARTFORD LOOP

WE WERE QUITE interested in the article on page 111 of the September HPAC recommending a method of making Hartford loop connections to steam boilers.

We do not agree with the sketch showing the method adopted in Wisconsin, as we are quite certain that under certain conditions of boiler operation, noise and vibrations in the boiler header and equalizer will be experienced.

It is poor engineering practice to use the boiler equalizer as a connection where make-up water is added to the boiler. The equalizer should be used for the purpose of equalizing the top and bottom of the boiler and should also act as a drip connection. Under certain conditions, the boiler will be under a vacuum and if the pump discharge is connected as shown on this drawing, the make-up water will have a tendency to rise up in the equalizer and header. If this does occur, then the noise and vibration will be terrific and far greater than any noise or water hammer produced from an improperly installed Hartford loop connection.

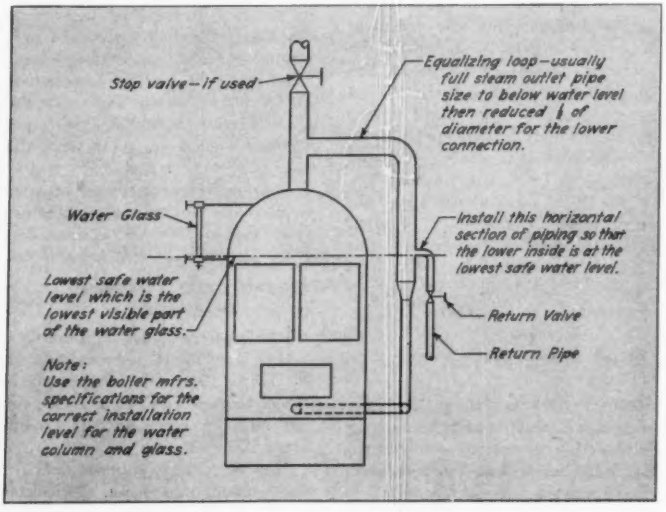
It is considered good practice to have both a boiler header and also a return header. If a Hartford loop is to be installed, the installation should be such that the pump discharge goes directly into the return header rather than into the equalizer connection.

Also, it is considered good engineering practice to install the horizontal run of the Hartford loop 1 in. below the normal boiler water line level and it is essential that this horizontal run be a close nipple. If the horizontal run is of any length greater than a close nipple, under varying conditions of the boiler water line water hammer will occur in this horizontal run and cause considerable noise and vibration of the boiler piping. The run may be half full of water and half full of steam and when the pump discharge enters this run, water hammer is set up to such an extent that considerable noise and vibration occur.

We have been on too many jobs where noise and vibrations have been the cause of considerable difficulty — in some cases the vibration being so intense that pipe threads on both the header and equalizer lines have been stripped.

We are looking forward with interest to other comments on the type of connection shown in the article. —FRED N. SCHAAD, District Representative, Warren Webster & Co.

HERE'S THE SKETCH from the September article showing the recommendations for Hartford loops on low pressure heating boilers, details of which are objected to by Mr. Schaad


Stop valve—if used
Equalizing loop—usually full steam outlet pipe size to below water level then reduced ½ of diameter for the lower connection.
Water Glass
Install this horizontal section of piping so that the lower inside is at the lowest safe water level.
Lowest safe water level which is the lowest visible part of the water glass.
Return Valve
Return Pipe
Note: Use the boiler mfrs. specifications for the correct installation level for the water column and glass.

Remodeling Jobs

are easier, faster, more profitable with

REVERE

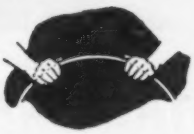
copper water tube

Revere Copper Water Tube is made to order for remodeling. For you don't have to "tear down the house" to install it. When you use Revere Copper Water Tube it's a plumbing job for you and not a major alteration job. Often, it is possible to simply run it through the floors and partitions to the basement without even taking out the old piping, such as workman in picture is doing.

Why Revere Copper Water Tube is easier and faster for you to install is shown in panel at right. For these reasons Revere Copper Water Tube is more profitable for you to use. There are no worries about rusting and once installed you can forget it. Customers are satisfied and your reputation is protected.

Now with restrictions eased, and permissible quantities without allotments greatly increased, there isn't any reason why on your next job you can't take advantage of the many benefits of Revere Copper Water Tube for radiant panel heating, hot and cold water lines, underground service lines, oil burner service lines, and waste stack and vent lines. See the Revere Distributor nearest you today. And, if you have technical problems, he will put you in touch with Revere's Technical Advisory Service.

...here's why



EASY TO BEND

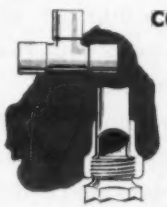
Saves Time

Revere Copper Water Tube is easy to bend. Soft temper can be bent by hand to meet installation conditions. Hard temper by hand bending tools.

HANDY LENGTHS

Save Fittings... Labor

Revere Copper Water Tube comes in straight lengths of 20' in hard and soft tempers. 60' coils of soft temper reduce the number of fittings needed.



SOLDER OR COMPRESSION FITTINGS

Need Less Work Room ... Save Metal

No worry about wrench room when you use Revere Copper Water Tube with solder fittings. Compression fittings can also be used. No threading is necessary with either type fitting. Wall thickness of tube used can thus be less than for threaded pipe.

NON-RUSTING

Rustable pipe eventually clogs as shown in drawing at top right. Non-rustable Revere Copper Water Tube suffers no loss of flow or pressure as shown at bottom right. No allowance in pipe size need be made for rust accumulation with Revere Copper Water Tube.

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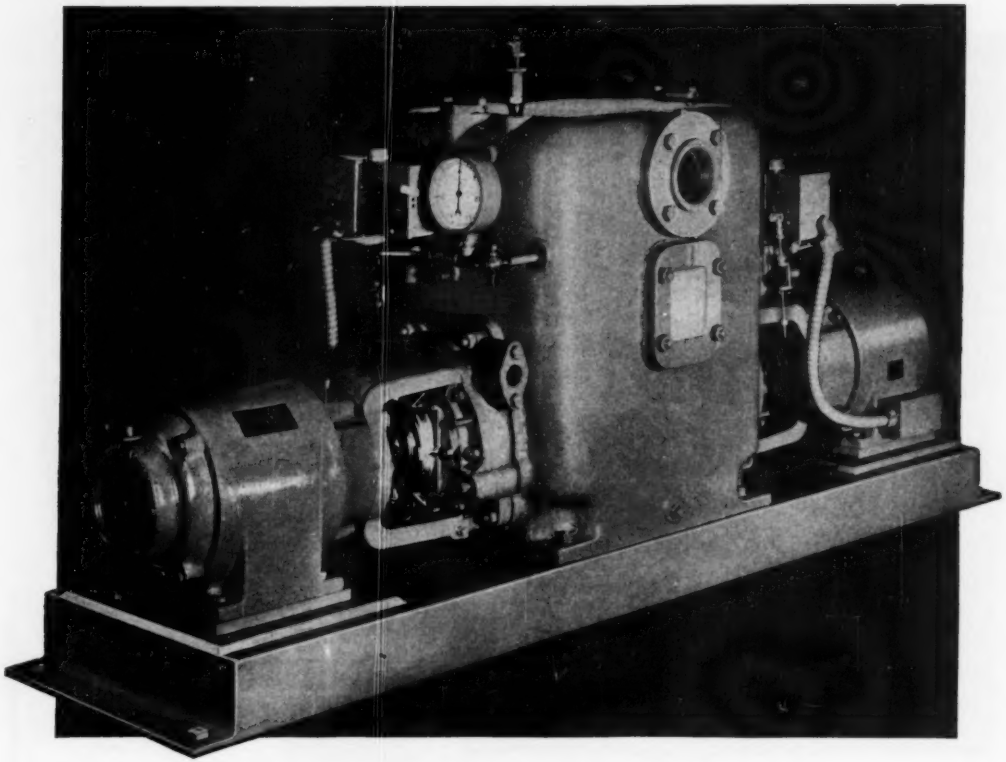


THE HEATING PUMP WITH CERTIFIED PERFORMANCE

A Jennings Return Line Vacuum Heating Pump may be installed with the absolute assurance that it is of the proper capacity to keep your heating system at top-notch efficiency.

For the actual working capacity of your Jennings Pump is determined by careful tests under working conditions, and with the actual motor that goes on your job, regardless of current characteristics. Every Jennings Pump has to deliver full rated capacity of air and water simultaneously before it is released.

The Jennings Heating Pump has everything in the way of safety, convenience, and real dollar saving economy that years of experience as leading heating pump manufacturers have enabled us to put into it. Quality is backed by an unchallenged reputation, and satisfactory performance is assured by a nation-wide network of Sales and Service offices.

THE NASH ENGINEERING COMPANY
SOUTH NORWALK, CONNECTICUT, U. S. A.

FIG. 1—THE INCREASING amounts of exterior glass and general illumination in office buildings mean high internal sensible heat loads and high quantities of conditioned air

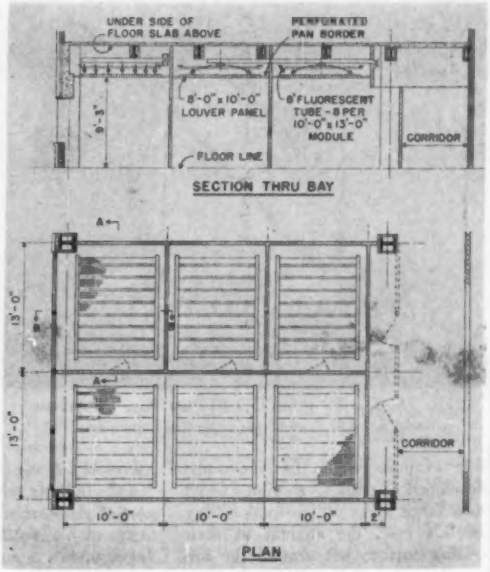


FIG. 2—PLAN ABOVE CEILING and section through typical bay. Ductwork shown illustrates scheme selected after test work was completed. Sections A-A and B-B are shown in Figs. 5-10 and Fig. 12

Air Distribution Studies

. . . . for louvered or "egg-crate" ceiling design to be used in The Detroit Edison Co.'s new office building

By R. V. Martelli and H. O. Scarlett
Mechanical Engineers, Construction Engineering
The Detroit Edison Co.

THE AMOUNT OF exterior glass and the level of general illumination used in office buildings have steadily increased during the last 15 years. These two items account for most of the internal sensible heat gain when computing cooling loads for comfort air conditioning in office buildings. Today, internal sensible loads are often of such magnitude that it takes very high quantities of air to carry the loads. Not many years ago, six to eight air changes per hour were considered high for rooms with conventional 9 ft to 11 ft ceiling heights. Now, however, the rates of air change on some jobs exceed 16 per hour for rooms with such ceiling heights.

One method of handling high internal sensible heat loads is to use cooling panels — primarily in the ceiling — supplemented with dehumidified air for ventilation and moisture removal. This solution eliminates the problems of air distribution which accompany high rates of air change.

In some instances, however, certain physical features of the room make it impractical to use this approach.

FIG. 3—ROOM IN TYPICAL test bay. Inspection window at right is only for observing smoke tests

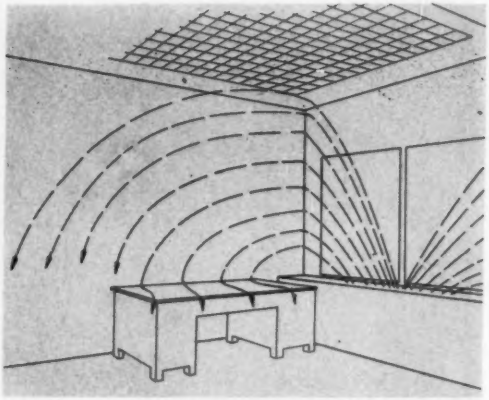


FIG. 4—WINDOW SILL SUPPLY system's air flow pattern in the test room

One example is the fairly recently developed lighting method which uses large areas of louvered ceiling. In this case, the amount of plain ceiling surface left around the louvered portion is usually too small to provide sufficient cooling panel area. Of course, this deficiency in the panel area could be made up by using more conditioned air than is required for ventilation, but the cost for such a split panel and air system would most likely be greater than for either system alone.

Two years ago, the design of the new Edison Building, in Detroit (Fig. 1), a 16 story office building of modular design costing approximately $10 million, was fairly well decided upon. Louvered ceilings were seriously being considered for use in the lighting scheme. Generous exterior glass areas plus a lighting wattage of 5.5 watts per sq ft of floor area and a nominal occupant load of two persons per room all combined to make it necessary to supply 16.7 air changes per hour (air introduced 18 deg below room temperature) to the west exterior rooms. The rates of air change in exterior rooms on the other exposures were also very high, running from 14.5 to 16.0.

The requirements of the interior rooms were conventional (7.5 changes per hour.) Nevertheless, the fact that most of the exterior rooms required above 14.5 changes per hour caused much concern over the problems in air distribution which could be caused by these high rates of air change.

WHAT THESE STUDIES SHOW

The air distribution studies described here were for application to a particular modular room having a louvered ceiling and fixed physical dimensions. The following conclusions are general, however, and should apply to any installation.

Air supplied over a louvered ceiling of ordinary room height must be spread above it before introduction into the room. This should not be attempted by directing the primary stream up toward the slab above.

In cases of the lower air quantities, this spread may be accomplished with certain types of commercially available diffusers which discharge the air in a horizontal plane. It is important, however, that the diffuser be mounted a reasonable distance above the louvered panel to allow a spread of the supply air before it impinges on the louvered panel and is deflected down into the room.

For high air quantities, more elaborate means of spreading the air above the louvered ceiling may be necessary to assure draftless distribution in the room. One satisfactory method is to use perforated tubes.

Whatever type of diffusion is used, care should be taken that the throw is not great enough to strike walls, beams or other obstructions above the louvered area.

Full Scale Model of Building Bay

Since the architects and lighting engineers also had many questions to answer, it was decided to build a full scale model of an entire bay for the new building. The model was completely equipped with refrigeration, heating and air handling equipment, such that any temperature of air from 55F to 120F could be supplied at a controlled static pressure up to 1 in. of water. Further, pneumatic thermostats provided four separate zones of temperature control. Architecturally, the model followed the design of the new building even to the point where a second suspended ceiling was built above the normal one in such a manner that it duplicated the underside of the floor slab above, including fireproofed beams.

The architects tried out the use of many building materials, room colors and furniture arrangements. They also studied "module size", and made a basic change in the design of the building by reducing the module dimensions of the original design to the present 10 ft by 13 ft by 9 ft, 3 in. ceiling height module. Lighting engineers tried out several lighting schemes and confirmed their earlier choice which consisted of running eight fluorescent tubes over an 8 ft by 10 ft louvered area. Fig. 2 shows the design of a typical bay in the new building and this lighting arrangement.

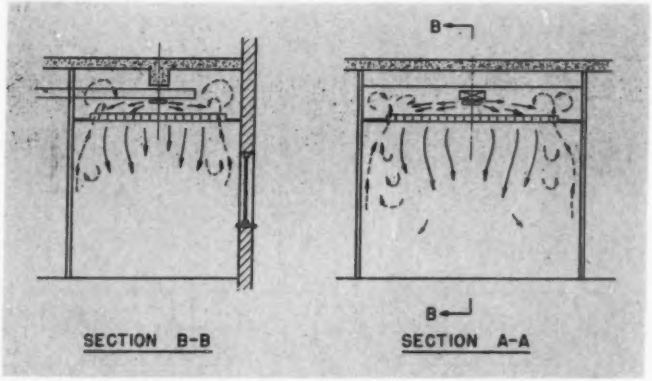


FIG. 5—DIFFUSERS provided satisfactory distribution up to 11.3 room changes per hour

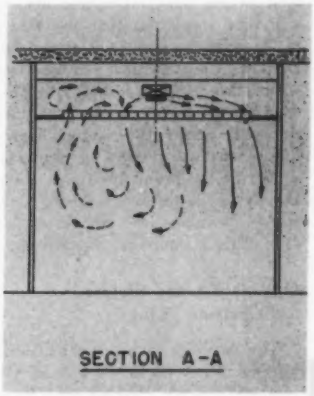


FIG. 6—TYPICAL AIR DISTRIBUTION pattern for single diffuser when supplying over 13 room changes per hour. Sketch shows effect of induced room air motion (dotted arrows) on primary air stream (solid arrows)

Preliminary air distribution tests were run during the time the lighting and architectural studies were being made, and as soon as these factors had been settled, final air distribution work was begun.

Tests were run in rooms which consisted of the basic module size of the new building, 10 ft by 13 ft by the 9 ft, 3 in. ceiling height. Fig. 3 shows one of these rooms in the model bay. The smallest rooms in the actual building will have these dimensions, and all other rooms will be multiples of this module size. Supply air temperatures were depressed 18F below room temperature (normally 75F.) The only schemes that were judged satisfactory were those in which no air motion below the 6 ft level exceeded 50 fpm. Further, the temperature difference between any detectable air current and the surrounding air had to be less than 1 F. Thermocouples with very fine junctions to minimize errors due to radiation were used to measure temperatures, and a commercial thermal anemometer was used to measure air velocities.

Window Sill Supply System Tested

The first scheme tested was a standard commercial window sill supply system. Because this method of air distribution is intended for use primarily in exterior rooms, it was tested at the maximum requirement of 16.7 air changes per hour. Briefly, the discharge stream left the window sill grille in a plane parallel to the window and fanned out until it struck the side walls. Fig. 4 shows the general air pattern at the time of the first test. By adjusting the grille in the sills, the vee was eliminated from the discharge pattern but the drafts found along the side walls were shifted to another part of the room. Next, the louvered ceiling area was covered with heavy paper — which, in effect, changed it to a smooth surface ceiling. This was done to see how the louvered area was affecting the air distribution. The result was that the air flow adjacent to the "paper ceiling" carried toward the rear of the room farther than when the louvered panel was exposed. This extra carry gave the primary air stream more distance in which to decay before it entered the occupied portion of the room. While this helped to reduce the velocity of the drafts, it did not lower them to the 50 fpm limit. It was felt that the reason this window sill system could not be made to distribute the air satisfactorily was due to the very high rate of air change. No further tests were conducted which involved supplying air to the room from below the ceiling.

Side wall grilles — which are usually an inexpensive method of supplying conditioned air to a room — were ruled out, since they could be used only for the rooms next to the corridor. In the interest of uniformity it was decided that at least all the inner rooms should have the same method of air distribution and, if possible, the exterior rooms should also use the same system.

Ceiling Diffusers on Exposed Ducts

The next method of air supply considered consisted of mounting diffusers on the undersides of exposed ducts run above the ceiling so that each outlet would be directly over the center of the 8 ft by 10 ft louvered panel. Each of the nine diffusers selected was to be tried out (1) at the low air quantity to see if it would be satisfactory for an interior room, and (2), if it might be suitable for use in some of the exterior rooms requiring more air up to the maximum for the west exterior rooms of 16.7 changes per hour. Several of the diffusers satisfied the required room conditions at the low quantity of 7.5 changes per hour, some could handle up to 11.3 changes per hour, but none was acceptable at the maximum air quantity — according to the standards given above.

Fig. 5 shows the general air distribution pattern when the conditions in the room were satisfactory. The solid arrows in this and the following figures show the primary air stream, and the dotted arrows show the general motion of induced room air. The diffuser was 18 in. below the floor slab above and there was therefore no surface for the discharge stream from the outlet to cling to. The air movement through the louvered area was mainly downward — except at the edges of the panel, where the induced room air was drawn up into the ceiling space to be mixed with the main supply stream from the diffuser. These tests showed that it was necessary for the outlet to spread the supply air evenly over

most of the panel area, and also it was very important that the throw of the diffuser should not extend beyond the louvered area. In the cases where the throw did carry past the edge of the louvered area to strike the wall above the ceiling, heavy downdrafts were found in the room under the border of the panel. Conversely, if the throw was insufficient, heavy downflow was found in the area of the room under the diffuser.

Outlets Pushed Beyond Selection Point

The diffusers tested first had been selected for a throw of 4 ft at 150 cfm or 7.5 air changes per hour. Some of these diffusers were satisfactory up to about 260 cfm. Over 240 cfm or 11.3 changes per hour, however, air noise was considered too loud for an acoustically treated private office. It was realized that these outlets were being pushed beyond their selection point, so larger diffusers picked for a 4 ft throw at 335 cfm, or 16.7 changes per hour, were then tested. Noise was no longer a problem, but drafts in the room were. The general air motion in the room for air quantities above 13 changes per hour is shown in Fig. 6. A swirling motion was set up in the room in such a way that most of the supply air would come down through the louvered panel in one half of the room while induced room air travelled up through the louver into the ceiling space on the other side.

While these findings led to the conclusion that no further attempts should be made to handle over 11.3 changes per hour with a single commercial outlet for every 10 ft by 13 ft room, it is realized that this cannot be taken as a general conclusion for other applications. *The results obtained apply specifically to the room configuration described.* With higher ceilings, greater distance between the outlet and louvered panel, or a different type of occupancy which would permit less critical standards of air distribution, it is no doubt possible to handle more than 11.3 changes per hour in an acceptable manner.

Since it had not been possible to obtain satisfactory air distribution at the higher air quantities with a single diffuser per room, other schemes for spreading air over the

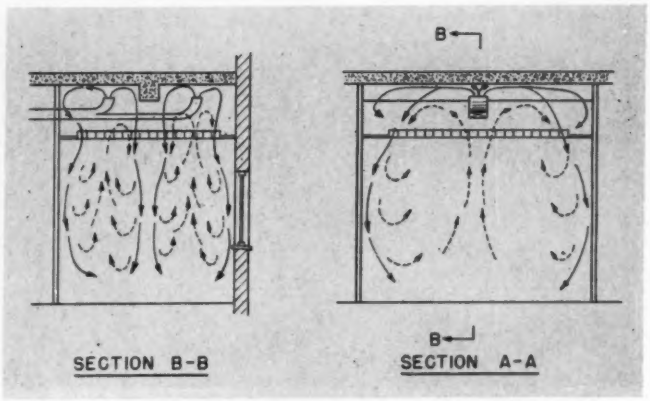


FIG. 7—TWO UPSWEEP ELBOWS feeding from the top of the supply duct were tried. Air followed the slab until deflected down by the walls or the beam

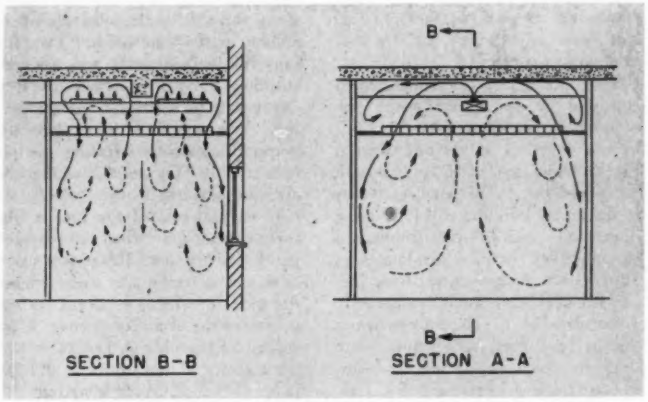


FIG. 8—NEXT, CONTINUOUS SLOTS were tested. This sketch shows air flow for two ½ in. by 36 in. slots on top of duct

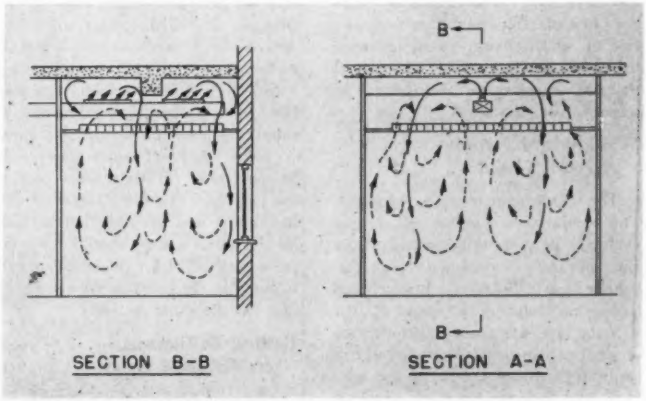


FIG. 9—TWO WIDER SLOTS, 3 in. by 36 in., were tried in order to reduce the throw along the floor slab

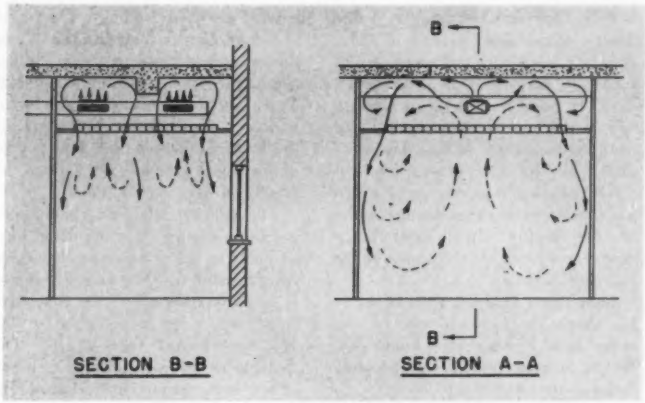


FIG. 10—DOUBLE DEFLECTION GRILLES were next installed in sides and top of duct. This shows air flow pattern with six 4 in. by 12 in. grilles

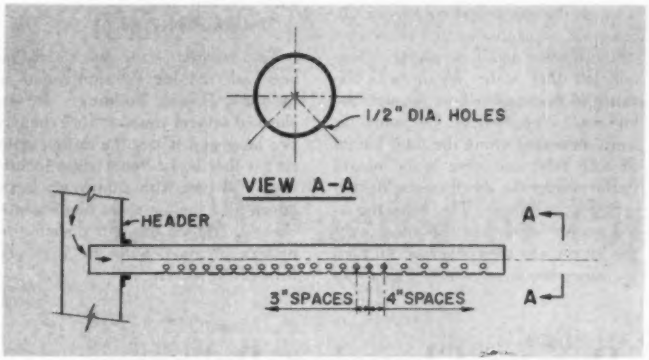


FIG. 11—SOLUTION TO THE PROBLEM was developed by introducing the air through equally spaced perforated tubes

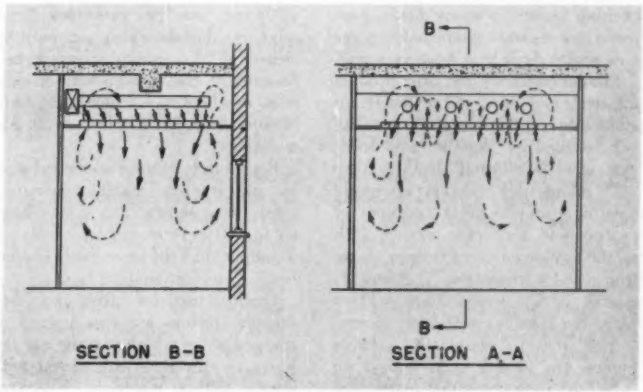


FIG. 12—FOUR PERFORATED TUBES supplying 16.7 room changes per hour gave this air flow pattern

louvered panel were tested at 16.7 changes per hour. Some of these may be seen in Figs. 7 through 10.

Several Other Schemes Are Tested

The first installation, shown in Fig. 7, consisted of two upsweep elbows feeding from the top of the supply duct and discharging up toward the underside of the floor slab above. One elbow was placed about midway along the duct, and the other elbow was at the end of the duct. Fig. 7 shows how the air followed the slab until deflected down by the walls or the beam, causing high velocity downflow at the walls and under the beam.

Next, a continuous adjustable width slot in the top of the duct was tried, Fig. 8. With narrow slot widths there was high velocity downflow at the side walls and under the beams because of the carry of the primary air stream. When the width was increased in an effort to reduce the throw of the supply along the bottom of the floor slab above perpendicular to the flow in the duct, the angle of discharge from the slot was decreased and the result was a heavy pile-up of the air at the far end of the room and under the beam, as shown in Fig 9. Straighteners in the slot reduced the pile-up but wall drafts still made the system unsatisfactory.

To provide better control of the air issuing from the slots, and chiefly to thicken and spread the initial stream and to reduce its tendency to hug the slab, the next step was taken. Double deflection grilles were installed to replace the open slot on the top of the duct, but even after many vane settings it was not possible to get satisfactory air distribution. The problem again was heavy downflow at the walls.

Grilles were then added in the sides of the duct with no improvement in results. Fig. 10 shows this scheme. After this, grilles were also installed in the bottom of the duct. This last alteration changed the room air flow from drafts at the walls to drafts under the duct.

Decided To Direct Air Stream Down

The conclusions drawn from these tests were (1) that the supply air stream should be directed down

through the louvered area rather than up toward the bottom of the floor slab above, and (2) that when handling over 11.3 air changes per hour, the air should be introduced from several places in order to achieve the necessary spreading of the supply stream over the louvered area.

One solution that was developed was to introduce the air into the room through several equally spaced perforated tubes located above the louvered ceiling. The basis of design for these tubes was a paper by Alfred Koestel and G. L. Tuve, entitled The Discharge of Air from a Long Slot, which appeared in the ASHVE Journal Section of Heating, Piping & Air Conditioning, January 1948. While this paper deals with continuous slots, it was felt that the information presented would also apply sufficiently well to an interrupted slot to make application of the design principles practical.

Design of Perforated Tubes

According to the paper, the important design factor for a slotted duct fed from one end is the ratio of the total slot area to the cross-sectional duct area. For slot area to duct area ratios of 2.0 to 0.2, average air discharge angles of 50 to 85 deg could be obtained. It was decided to design for an 80 deg angle of discharge, which gave a ratio of 0.57. The tube configuration consisted of a 6½ in. diameter tube with ½ in. diameter holes punched 3 in. on centers in three rows displaced 45 deg from each other. This design is shown in Fig. 11. It was felt that the 80 deg angle of discharge would not cause trouble since the angularity of the supply stream should be straightened out by the vanes of the louvered panel.

Four tubes were installed about 18 in. above the louvered ceiling and tested at 16.7 changes per hour. The results seemed very promising even though the air flow through the louvered panel under the ends of the tubes was greater than through the louver under the beginning of the tubes. This condition was assumed to be due to the air discharge angle. Because the tubes were conservatively designed according to the principles of the Koestel and Tuve paper, it was not felt that static regain was the cause of the uneven flow through the louvers. Nevertheless, jet velocities were measured along the total length of each tube and were found nearly uniform over the downstream 90 percent of the tubes. The behavior of the supply stream in the space over the louver was then observed through an inspection window in the side wall located above the ceiling. The angle of discharge was about 75 deg. While this was very close to the angle designed for, the carry of the air stream above the louver was greater than had been anticipated. The vanes of the louver, however, did have a pronounced straightening effect when the supply stream struck them.

The problem of pile-up was eliminated by taping off every fourth set of holes in the downstream one-third of each tube, which gave a spacing of 3 in. on centers for the first two-thirds and 4 in. on centers for the last one-third of tube length. The differences in air delivery between tubes were minor, but what differences did exist were corrected by dampering — which merely consisted of sliding the tubes in or out of the header, as shown in Fig. 11.

This Is the Method Selected

This method is the one which has been selected for exterior rooms in the new Edison Building. It was checked several times at 16.7 changes per hour and it met the design criteria — that is, no room air velocities above 50 fpm with supply air introduced 18 F below room temperature. Fig. 12 shows the air distribution pattern obtained with the four perforated tubes.

Big Vacuum Pumps Changing Processes

GIANT VACUUM PUMPS that can expel all but one molecule of air in every billion are revolutionizing many facets of American life, according to Steelways, official organ of the American Iron and Steel Institute.

High vacuum equipment and processes — developed partly to and in the manufacture of atom bombs — have made possible the mass production of frozen citrus juice concentrates and soluble coffee; the vacuum drying of penicillin and other antibiotics; vacuum dehydration of blood plasma; and the successful extraction of vitamins A and E from fish, liver and vegetable oils.

"Because of high vacuums now attainable," the article says, "the life of television picture tubes has been increased by more than 500 percent. High vacuum deposition of metal plating on plastic, glass, fabric and sheet materials is creating new and exciting beauty in many fields. Formerly dye-resistant synthetic fibers are now easily dyed in a high vacuum."

Similar methods are also producing steels and alloys of previously unattainable purity, density, ductility and fatigue life. Another new development is "scuffproof" leather.

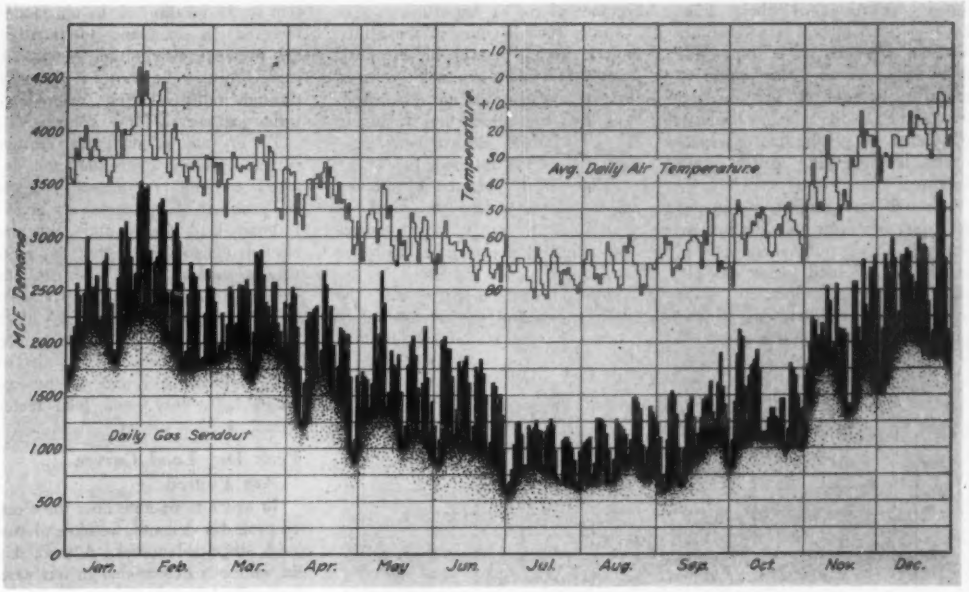
"Without high vacuum we would have none of the great machines of nuclear and electronic science such as the cyclotron, synchrotron, betatron and cosmotron," Steelways claims. "We would have neither radar nor 2 million volt X-ray tubes."

The reason mammoth vacuum pumps are having such impact on industrial methods is that matter can be made to assume different states almost at will in a vacuum from which most of the molecules have been extracted. Says Steelways:

"Water can be vaporized from solid ice; metals which can only be melted at atmospheric pressure can be made to boil; and beams of electrons can be directed in straight lines because they don't collide with gas molecules."

Recent tests of vacuum-melted steel by anti-friction bearing manufacturers have shown that it may have up to 300 percent greater resistance to fatigue than the same grade of steel from a conventional melt.

Castings used for valves and other pressure fittings are now purged of trapped air in a high vacuum and the pores in the metal are closed with special filling materials. Vacuum impregnation of a wide variety of materials is coming into wide use.



DAILY GAS SENDOUT for a typical year as compared to the average daily air temperature

Load Factor of Pipe Lines

. . . . leads to demand commodity rate for gas utilities. How one company predicts loads to guide its operation

By George L. Wigglesworth, Jr.

Engineer, Citizens Gas Fuel Co.
Adrian, Mich.

THE NATURAL GAS utility deals in many miles of pipe, in many sizes of piping, and in many pressures. The piping represents a major investment.

It is the desire of the gas distribution engineer to size his piping system as economically as possible. However, the variable factors of expansion, unpredicted load, life of the pipe, and the pressures make the problem complex. As a result, we find relatively poor load factors in some lines, which must be sized for the coldest day of the year when the heating loads create a high demand.

Recognizing that high load factors are good for maximum return on the piping investment, some cross-country pipe line companies have asked to have a rate schedule set up on a demand commodity structure. This has apparently been endorsed by the Federal Power Commission. The schedule calls for a demand rate based on a maximum elected daily demand in any one month, plus a monthly commodity charge per cubic foot. In order to put operating limitations on this elected demand, the utility is required to pay for 90 percent of its elected demand — even though the demand is not used.

The pipe line companies tend

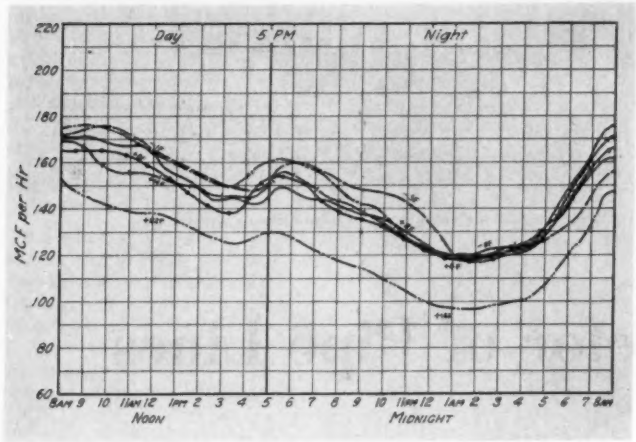
toward operation of their lines at a high load factor — a desirable situation. However, it is impossible for a utility serving the public to expect to operate at a high load factor, and the load factor problem appears to be getting more serious as more space heating customers are connected.

Although many utility companies have had problems of distribution, the problem of purchasing natural gas on a good load factor has not been of much consideration. With the demand commodity type of rate, however, the problem of operation becomes of major importance.

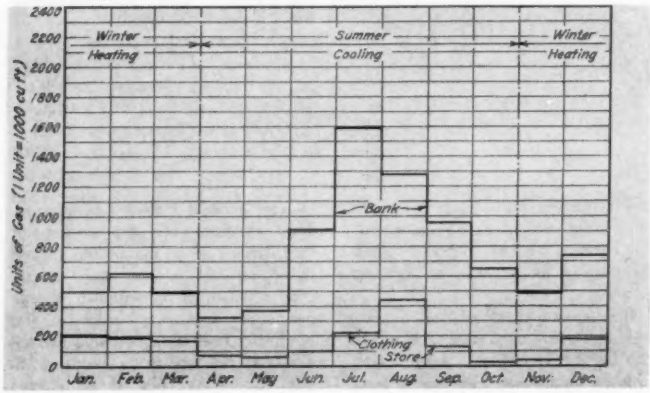
Under such a contract, the utility pays a demand charge for the peak day demand and a commodity charge for the monthly volume purchased. Peak days are elected and, if during any month the elected peak consumption is not reached, the utility is billed for 90 percent of the demand. If the utility goes over its elected demand a penalty rate comes into effect, (in our case, $10 per MCF).

On our distribution system, the incoming natural gas is metered at a town border station. It is then sent to the location of the old manufactured gas plant and put into the low pressure distribution system. A high pressure line circles the city through industrial areas, where factories are served large volumes.

To operate a small distribution system economically under the demand commodity contract presents the problem of attempting to create a good load factor and take the elected demand every day. By plotting a season graph, one can see at a glance that many valleys exist and that the elected demand cannot be met every day. In fact, if one could operate between the elected peak day demand and 10 percent below it, a very good load factor would result.



PEAK DAY LOAD curves for various outdoor temperatures, as plotted by the gas utility. Curves indicate that, regardless of temperature, the pattern holds the same form, shifting down or up according to the temperature



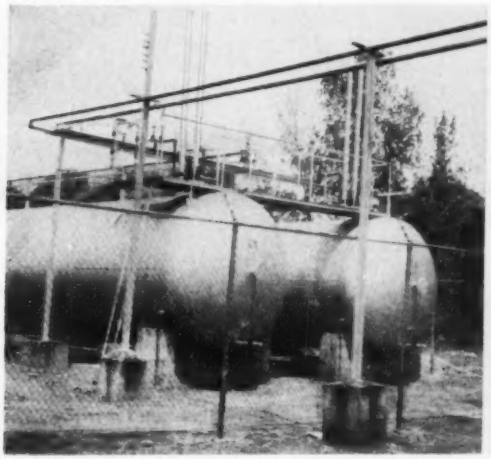
GAS CONSUMPTION for winter heating and for summer air conditioning by two commercial customers. Use of gas for summer cooling more than balances out the winter heating load

Peak Day Load Curves Are Plotted

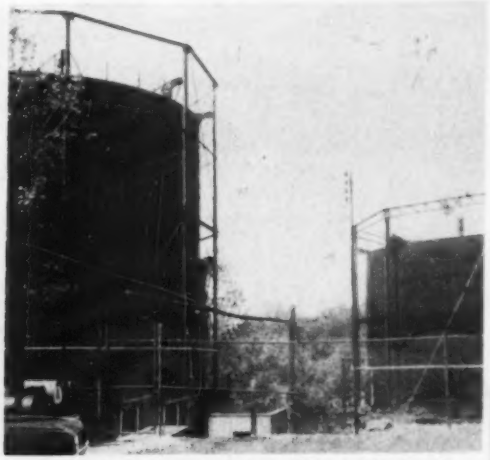
In order to operate near the elected peak day demand, we have plotted peak day load curves. A peak day in winter is determined in our case, by multiplying the hourly load from 7 a. m. to 8 a. m. by a factor of 20, when the temperature is below 32 F. This will be a preliminary prediction of the day's load. If the result indicates that a peak day may be in the making, hourly readings are taken from the town border station orifice meters. By plotting these hourly loads on a graph, a trend line can be sketched to give a very accurate prediction. Our method is to plot a curve over another series of curves previously plotted with temperatures noted.

We have found that by reading the differential flow meters at 5 p. m. in the evening, we are able to sketch in a very accurate curve, having first plotted the actual flow up to that hour. If we predict at 5 p. m. that we are within 50 MCF of our 90 percent contract load, we again note and plot the meter readings at 11 p. m. that night. It is then possible to decide on the course of action to cut the load — dumping holders or making gas. If cutting the load is considered, it must be done far enough in advance to avoid the relatively low loads of the night hours.

Assuming that the load is cut off or gas is being made to satisfy the 5 p. m. and 11 p. m. calculations, a third reading can be made of the meters at 6 a. m. By plotting the hourly graph from 8:30 a. m. one day to 6 a. m. the next, and esti-



TWO 30,000 GAL tanks of liquid propane for use in peak shaving, or in emergencies



STORAGE HOLDERS can be used by anticipating the gas load

mating the following 2½ hr to 8:30 a. m., a very exact estimate can be obtained. Knowing the load anticipated, holders can be dumped at a relatively high rate to reduce and give very accurate load control. Thus, by knowing the weather prediction, a curve can be plotted and sketched. The resulting curve will usually be accurate within less than 5 percent.

Time Is Gained To Control Load

By using the peak day load curves to predict the occurring load, time can be gained to control the load. By anticipating the load, storage holders (a carry-over from the old manufactured gas plant) can be used. Normally, these holder supplies are small in comparison to the 24 hr load; in our case, they would be approximately 8 percent of the load on a cold winter day. They, of course, are much more useful in summer when they represent a larger percentage of the day's load.

The disadvantage of storage holders is the possibility of two peak days occurring together. The holders — having been dumped on the first peak day — would be empty on the second day.

This method is a very easy one to apply and should probably be called a "balancing load" scheme rather than a "peak shaving load" operation, since it permits the use of gas on a peak day purchased on a lower peak day.

Another method is the use of combination equipment by large industrial users, such as oil-natural gas equipment or L. P. gas-natural gas equipment. The price of the fuel competing with natural gas dictates the desirability or undesirability of this method of peak shaving. It is essential in this method to limit the number of this type of customer and to have these customers within easy contact for change-over. This change-over time is usually less than ½ hr. In considering interruption of such customers, it is better to over-estimate the time necessary for them to be off than to under-estimate. The profit the utility gains by the few extra MCF of gas sold is small in comparison to the demand cost incurred.

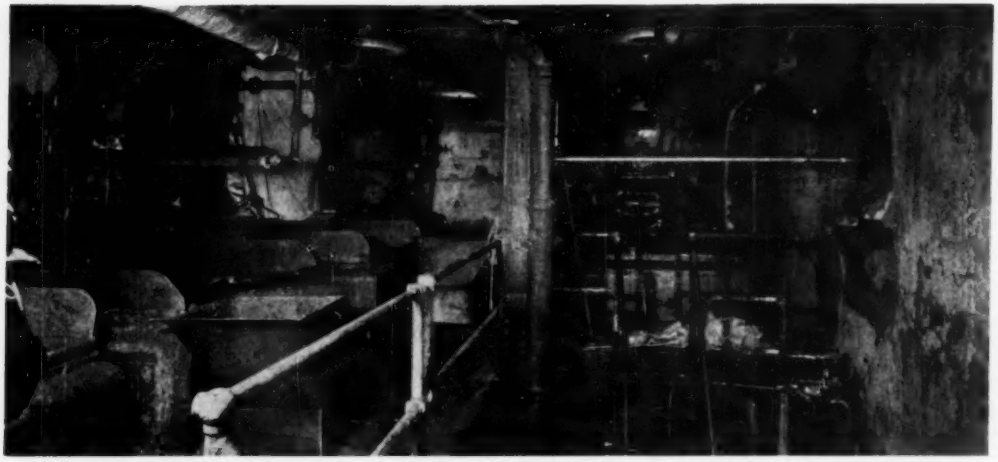
A third method of peak shaving is making a substitute gas — either manufactured gas or L. P. gas. The economics of making gas dictate the desirability of this method. In addition, the customer complaints and extra service calls must be considered. In our case, with propane-air at $0.90 per MCF, it would not be economical to peak shave more than three days to limit the use of gas at $2.75 per MCF. However, a penalty charge of $10 per MCF indicates it would be economical to operate 11 days with propane to prevent penalty during any month.

It appears that if space heating is added without a balancing load (such as air conditioning), peak shaving is here to stay. In any case, the operator is going to have to be very conscious of the load pattern of his system, and take stock of the peak shaving methods available. Since time is the main factor, all hourly rates of dumping holders, cutting off industrials, and making gas should be known. By having this information at hand, very close operation to elected peak day demand figures may be achieved.

Telemetric Transmitters Will Be Essential

It is anticipated that telemetric units to transmit electrically recordings of the hourly load will become essential. It has been found that although a 2 percent allowance is made for over-run on load calculations on the contract, a variation of the gravity of the gas can cause more than a 2 percent error in calculations and predictions. The only solution to this appears to be the installation of a gravimeter, or to have some source of reliable information from the pipe line company.

Our company is a small utility having approximately 62 miles of pipe in sizes from 2 to 12 in. Pressures range from the 100 psi contract pressure to the 6 in. water column distribution pressure. We have approximately 4900 customers — 1200 of them house heating. We are using this method of load prediction and have found it very suitable for guiding our operation.



A CLOGGED VENT PIPE caused this accident. The head blew off the rendering tank at the left, crashed through the wall at the right

Are Vented Vessels Safe?

Not when vents become clogged, as the accidents described here indicate. Vent piping should be inspected and cleaned regularly

DOES AN ATMOSPHERIC vent provide a vessel with foolproof protection against overpressure? Some seem to feel that it does. They figure that a vent is a sort of safety valve that can't go wrong — but the record doesn't back them up. Many explosions of vented vessels have proved that vent pipes are not foolproof.

Vents are depended upon to relieve pressure on countless steam heated, open vessels used in industrial plants. Rendering tanks, cookers, kettles, varnish tanks, return tanks and blowoff tanks are some examples.

Some of these vessels contain steam in jackets that surround the contents space. Others have steam coils. Still others take steam directly into the contents space.

Some are wide open at the top, like coverless kettles. Others, the ones we are concerned with in this article, have covers, lids, or fixed heads; but, since pressure is not wanted, they are vented in some manner.

In plants having such vessels, the question of explosion comes up for discussion eventually. When the owner takes stock of the operating hazards of his plant equipment, he might ask the engineer: "How about this condensate return tank: can it explode?" The usual answer will be: "I don't see how. This vent pipe is wide open all the time." The answer seems logical enough, but the trouble is that open vents can become plugged.

A few cases where vents failed to protect vessels against overpressure will be described.

At a meat packing plant, a jacketed rendering tank was used to cook, or render, waste products from the slaughterhouse. Vapors driven off during the process were conducted away through a 6 in. vent pipe which was open to the atmosphere. The pipe was supposed to relieve pressure in the cooking space of the vessel.

Piping Can Become Plugged

Over a period of time, pieces of bone, skin, grease and other material accumulated in the vent pipe and finally plugged it completely. Pressure built up in the cooking space of the vessel and the front head blew off, smashing through a wall of the building. The tank was thrown from its foundation by the reaction. Steam and hot grease blown from the vessel burned three workmen severely.

At another packing plant, a similar accident resulted when pressure developed in a vented vessel used

for drying blood. In this case, the vessel was equipped with a 4 in. vent pipe. The operators knew that dried blood would accumulate in the pipe and seal it off eventually; so it was their practice to ream it out at regular intervals. But they apparently over-looked this precaution for a time because the pipe became plugged, pressure built up and the vessel exploded.

As in the case of the rendering tank, the head was blown off and caused considerable damage to the building and equipment. But, unfortunately, the workmen did not escape. Four were killed in the blast.

Similar explosions of vessels containing viscous materials have happened in chemical plants, breweries, etc.

It does not cure the situation to equip such vessels with safety valves. There have been many cases where safety valves and their connecting pipes have become plugged, causing the same trouble.

Explosion discs, set practically flush with the inner surface of the vessel can be used; but there seems to be no real substitute for careful, frequent and regular checking and cleaning of pressure relief vents on vessels which contain materials that can solidify in the piping.

Freezing Obstructs Vent Piping

Explosions of vented vessels are by no means confined to those used for processing viscous materials. Condensate return tanks, which contain only steam and water, explode occasionally. An accident that happened in a laundry is an illustration.

In this case, the return tank was 2 ft, 6 in. in diameter and 4 ft long. It was vented through a 1 in. pipe that passed up through the boiler room roof, then ran horizontally across the roof for a distance and discharged into an open water tank.

It is believed that vapors froze in the horizontal run of pipe and plugged it during the night when the laundry equipment was shut down and only a light amount of vapor was being discharged through the vent.

The next morning, about ½ hr after the operators had started to warm up the laundry machines, the tank exploded with great violence. Both heads of the vessel were blown off and the shell plate was laid out flat. The roof of the boiler room was blown off and three walls were leveled.

Freezing often *appears* to be the cause of a return tank explosion but it usually cannot be proved by examination of the vent pipe. If a pipe has been obstructed by ice, it usually melts by the time the pipe is examined, or damage to the pipe may hamper the investigation. In one recent case a condensate return tank exploded so violently and wrecked the building so badly that the vent pipe could not even be found.

Vent pipes on condensate tanks or blowdown tanks sometimes fail to provide protection against overpressure because they become plugged with scale or because they are of insufficient size. Also there are quite a number of cases on record where valves in vent lines have been left closed, causing overpressure accidents. Of course, stop valves should never be installed in any vent pipe that is depended upon for overpressure protection.

Unusual Accident Involving Dye Kettle

An unusual accident to a vented vessel happened at a cotton processing plant when a dye kettle exploded.

The kettle was in the shape of a vertical tank, 4 ft deep and 8 ft in diameter. The top head was bolted on and could be removed for loading the vessel with material to be processed. Steam at 50 psig was fed directly into the contents.

There was no safety valve on this vessel, but it was connected to an open surge tank. The surge tank functioned to relieve pressure and also as a reservoir for dye liquid that was circulated through the kettle.

At times during the process it was necessary to reverse the direction of flow between the kettle and the surge tank. The operator could do this by turning the handle of a three-way valve in the piping between the kettle and the tank. With the valve in either position there would be free communication between the kettle and the surge tank for pressure relief.

After the vessel exploded, it was found that, if the operator turned the handle of the valve only part way, then the circulating lines would be shut off completely and there would be no means of pressure relief.

On the day of the accident, the valve was apparently turned part way and pressure built up until the removable head was blown off. The blast completely destroyed the two-story plant and seriously injured four persons.

How To Prevent Such Accidents

Preventing accidents such as those described requires proper installation, first of all. Any vent that is supposed to act as a safety valve should be treated like one. It should be of ample size. There should be no valves in the line. The piping should be arranged to avoid freezing of water in pockets, or of vapor at the discharge end. If all of these conditions cannot be met, the vessel should be equipped with a safety valve or rupture disc.

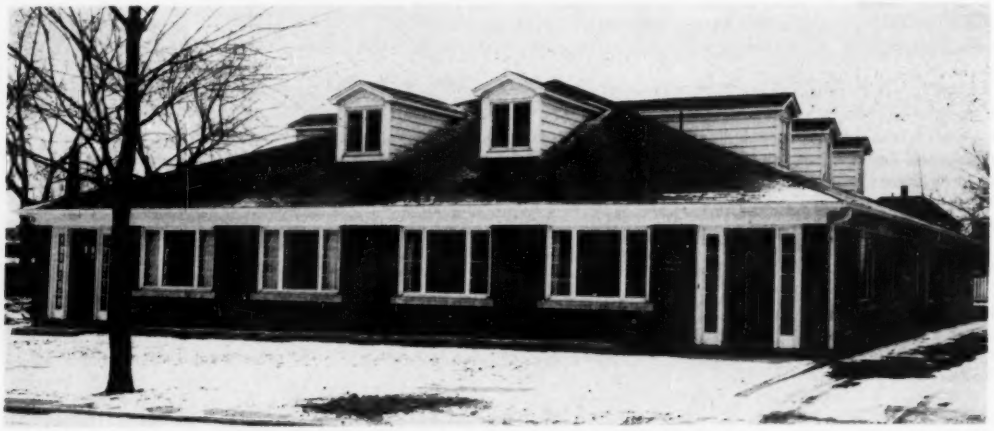
Inspections and tests are as important for vents as for safety valves. If vents could have test levers, like safety valves, they would undoubtedly be checked more often.

The fact that vapor can be seen discharging from a vent is not clear evidence that it is wide open. The pipe may be partially closed to the point where a little additional deposit is all that is required to close it off entirely.

The frequency of vent inspections will depend upon the contents and use of the vented vessel. On a tank containing only steam and water, once a year may be sufficient. On a vessel like the blood tank previously described, once a month may not be enough. The amount of deposit found in the piping at several successive inspections can be used to determine how often it should be cleaned.

Properly installed vents are about as simple a safety device as can be found for overpressure protection. When they are inspected and cleaned regularly, the chances of failure are slight — but they should not be considered foolproof.

[Republished by special premission from The Locomotive of The Hartford Steam Boiler Inspection and Insurance Co.]



GROUP OF DOCTORS in Erie, Pa., erect, as a cooperative move, a building for offices, waiting rooms, examination rooms which is . . . . . .

Doctors Cooperate

. . . . . erect a building for their offices, waiting rooms, etc., which is heated to their satisfaction by a baseboard system divided into five zones

By Roland A. Hazell
The National Radiator Co.

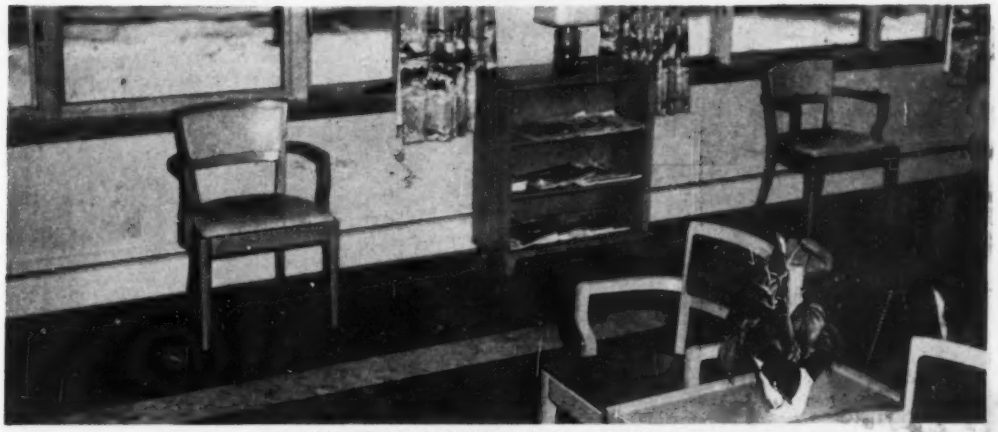
WHEN A GROUP OF Erie, Pa., physicians and surgeons decided, as a cooperative move, to erect a building to contain their offices, waiting rooms, examination rooms and laboratory, two important questions were how it would be heated, and what type of system would provide adequate and dependable heat. Baseboard radiation was decided upon, with a gas boiler to furnish the hot water heat.

Completed late last fall, the building was occupied in January of this year. The entire heating system was installed before the plasterers had finished and was placed in service almost immediately. The brick building, measuring 60 by 80 ft, is located in the southwestern residential section of Erie. Basementless, it is erected on concrete slab. It contains 28 rooms and seven toilet rooms on the first floor. It is divided in the center by a soundproof partition extending from the front almost to the rear, where there is a service entrance and where stairs lead to a second floor. Here, there are two suites for dentists.

Two physicians have their offices on one side of the building, and two surgeons use the other wing. Separate entrances are provided on each wing, the waiting rooms — each with large double picture windows — looking out on the street. Adjacent to each waiting room is a secretary's office, while also leading from the waiting room, at the other end, are toilet rooms. Extending almost to the rear of each side of the building are the doctors' offices, consultation and examination rooms. Still further to the rear are the supply, storage and utility rooms, together with the laboratory area.

Building Has Five Zones, Each With Thermostat

Each waiting room has its own thermostatic control, while each of the suites, plus the treatment and other rooms, on each side of the



HEATED BY BASEBOARD radiation painted to harmonize with the plastering, unobtrusive in appearance, diffusing the heat evenly, and divided into . . . . . .

building, have separate thermostats. The building thus has five zones, each controlled by its own thermostat, the fifth zone being the dentists' suites on the second floor. The five zones operate at a 180 deg boiler temperature in a forced circulation system.

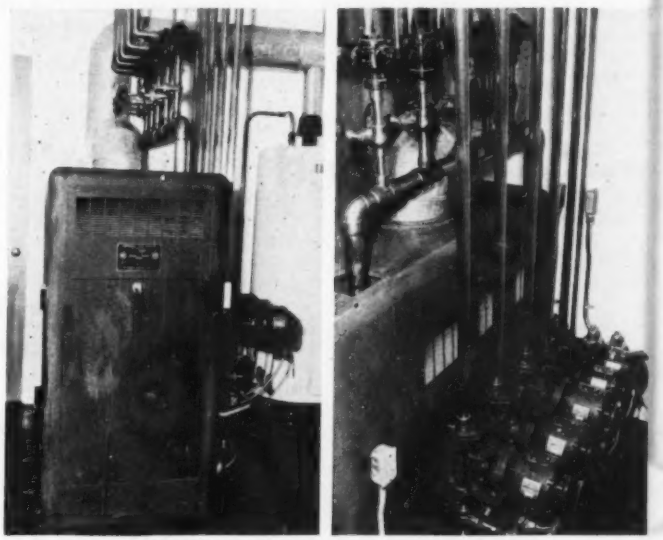
The gas boiler is installed in a large utility room, at the rear of the building, its flue leading directly into a chimney. A 45 gal automatic storage gas water heater is vented into the same chimney.

The baseboard radiation is installed in all of the rooms, mostly around the perimeter, although some is located on certain of the inner walls. In making the installation of the baseboard, the heating elements pass through walls and partitions, the covers ending at the wall or partition. It is painted to harmonize with the plastering, some rooms being finished in green, others in peach and some in buff.

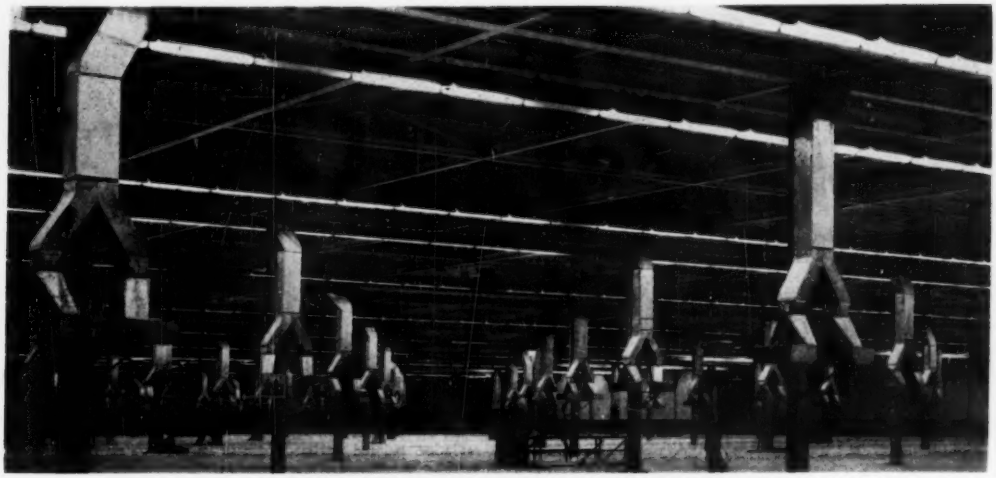
Baseboard heating was chosen for several reasons, according to C. N. Lambert, the heating contractor; primarily because it constantly heats and recirculates large volumes of air, diffusing the heat all along the outside walls and into the room. The thermostats are all located on the walls at a level about 4 ft, 6 in. from the floor.

"Erie's winters are mostly severe," according to Mr. Lambert, "and last winter we had some pretty cold days. Yet I have been told the heating service was excellent at all times. One thing that was especially commented upon was the fact that it was noiseless. All of the doctors commented on the silence of the system and the evenness of the temperature. The fact that the temperature for the waiting rooms could be regulated to provide more heat when there were few people, or less heat if there were many, was considered most gratifying. In the examination and treatment rooms, a somewhat higher temperature is maintained. The zone system of heat regulation, controllable from separate thermostats, also is a feature that pleases both the doctors and their patients."

Mr. Lambert also said that for heating the 35 rooms on the first floor, plus the suites on the second floor, the gas bill, even in the coldest months of the past winter, did not run to more than $50.



FIVE HEATING ZONES supplied by a gas fired boiler, each of the circulating pumps in the return lines being controlled by a separate thermostat



A VAST AMOUNT OF DUCTWORK went into the 20 acre Lincoln Electric plant. Ducts come down columns, have rotatable heads in many instances, and air can be directed to populated working areas, wherever they are. Air gradually creeps into stock areas, is exhausted by roof vents

"Advanced Design" Featured

. . . . . in The Lincoln Electric Co.'s new plant. Unique scheme of furnishing air to production areas is used. High temperature hot water heating system is one of largest in the country

ANY DISCUSSION OF The Lincoln Electric Co.'s new plant in Euclid, Ohio, must first recognize what some industrialists have termed "futuristic", "look-ahead", "most efficient" and "new thinking" features of the entire $8.5 million facility.

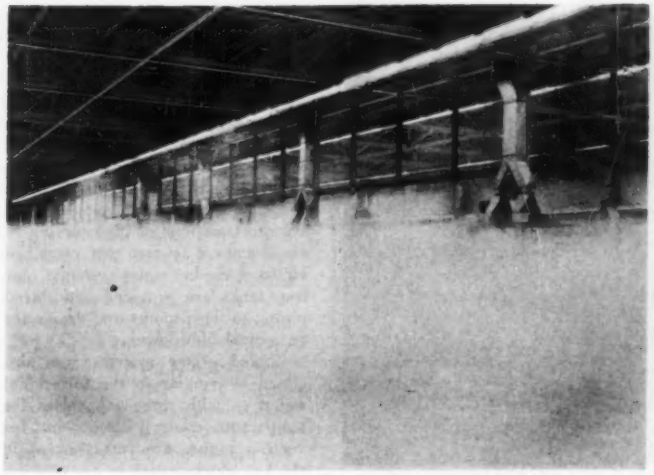
James F. Lincoln — who is the president of the company — had "advanced design" ideas for years before the first engineering steps were begun on the unique project. He wanted a plant designed to eliminate — not just to "solve" — materials handling problems; really straight production lines; no movement of anything twice in the same form; employee access to work areas without manufacturing interference; centralization of office operations to promote efficiency; and a design that would permit growth, development and creative expansion.

To realize all this (and more) meant combining new theories in electrical distribution, atmospheric control, handling of materials, production sequencing, etc. Into the 20 acre, aluminum sheathed, windowless structure went three years of planning and testing, including a "pilot" assembly line mock-up in the old plant.

Designed and built by The Austin Co., engineers and builders, this plant is primarily a single story welded steel structure measuring 500 by 1400 ft. A centrally located 60 ft wide service corridor runs below ground level the building length.

New Thinking on Cooling a Plant

Many of the plant's features will become more evident as various as-



SMOKE TEST SHOWS diffusion of air. The air from any particular production floor outlet forms a "mound" over the workers in that area; thus, the scheme is called a "man-cooling" system

MASTER CONTROLS for the air handling equipment. Controls include electric pneumatic system that is energized when on-off switch is thrown to start supply fans. Thermostats are of the type that pass air as setting is exceeded, or as temperature drops below setting; thus, two thermostats can control one valve

pects of the ventilating and heating arrangement are discussed. There had to be new thinking and applications in this regard, as the high clearances (23 ft under trusses, as in most factories of this decade, giving more stock storage and operating space for cranes over the tallest machines) made full air conditioning on a volumetric basis prohibitive in cost.

This cost would have exceeded that of the power required for all the machinery and lights in the plant. The Austin Co. tackled the problem with a new approach, using only a third as much power and reducing refrigeration tonnage to somewhere between 15 and 20 percent of the amount that would have been otherwise required.

The system draws outside air through roof intakes into truss-mounted heating or cooling units located at the center of each 60 ft aisle. The air is sent through ducts extending down columns to vents just a few feet above the workers' heads. Thus, a continuous supply of tempered air is delivered to populated areas, if and where it is needed. The air gradually sinks to the floor, disseminates into stockpile areas nearby, is gradually exhausted upward through roof vents.

The exhaust blowers in the roof discharge air by blowing vertically straight up. The dampers on the blowers are louvered so that the exhausting air opens them and they shut automatically when not discharging. Snow which may fall on the dampers will be melted by the warm air.

Furnace areas in the electrode plant half of the building are surrounded with metal curtains coming down within 8 ft of the floor, to trap the heat and process dust at their source and exhaust them before they get a chance to diffuse throughout the immediate areas.

The electrode division of the plant is equipped with economizers for using some of the heat generated by the process. The economizers are located on drying ovens and mix heat from the drying areas with fresh incoming air. The mixture is automatically controlled and can be, of course, varied to produce a desired temperature. These economizers save 4 million Btu per hr.

General ventilation, then, is forgotten in favor of direct heating (or cooling) for all employees. In the section of the plant devoted to fabricating welding equipment, the outlets along column lines are rotatable to suit individual needs; in the section devoted to electrode manufacture, which is of equal size, the air outlets are placed where people are working.

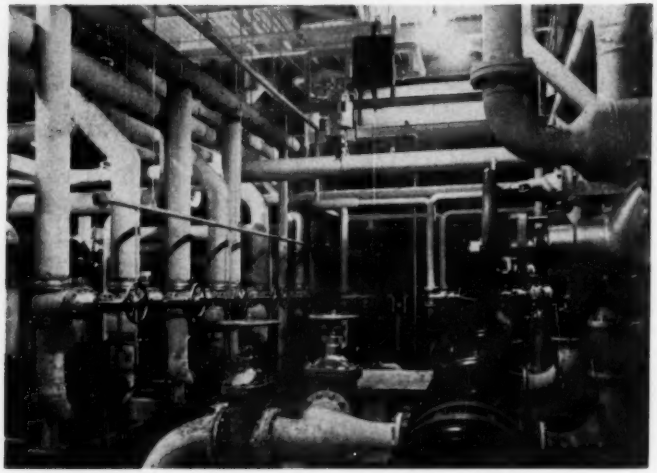
This factor is extremely important in the latter section, which must handle about 900,000 cfm of air in an area of some 350,000 sq ft wherein work 80 employees per shift. Some problems of balance and air distribution were encountered, but were solved without any essential changes in the overall planning.

But for 17 standard platform built-up units which supply both heated and cooled air in the two sections, all air handling units are standard factory units. The 17 mentioned have a capacity of 18,000 cfm, and are made up of a hot water heating and chilled water cooling coil, and a centrifugal fan. All controls on these built-up units are automatic. The majority of the other units of air handling equipment are blower type unit heaters and blower type unit heaters and coolers, with a few projection type heaters.

The office ventilation consists of controlled ventilation, dehumidifying when necessary but not adding any humidity.

High Temperature Hot Water Heating

The heating system is one of the largest high pressure, high temperature (300 F) hot water heating systems in the country. Economy in first cost and maintenance dictated this installation. Also, no steam is required for any part of the process work done in the plant.



MILES OF PIPING went into the high temperature forced hot water system, one of the most unique in the country. Controls call for a constant temperature of 300 F leaving the boilers to supply the offices, entry, kitchen, service area and so forth; temperature to plant area units varies according to outside temperature. Some of the many pumps are also visible here

TWO STOKER FIRED BOILERS bear the brunt of the heating load, while a smaller gas fired boiler handles the summer and light loads. A centralized control panel on each makes operation of most of the system highly automatic, while manual controls are used where deemed desirable

There is no heating in the service and other corridors. The air is extracted from them, drawing warm air through them from other areas.

Air handling systems use this hot water in water coils, temperature regulation being through face and bypass dampers or three-way mixing valves. At all high points — coils, and wherever else required — there are short sections of pipe serving as air chambers to trap out entrained air from the hot water systems. Air trap tanks are provided with bleed piping to downspouts and drains for periodical blowdowns.

Chilled water systems are also closed — similar to the forced hot water — with three-way valves for temperature control. Bleed points for venting piping are furnished as in the hot water system.

How the System Is Controlled

The pneumatic control systems are designed to be operated on 15 psig air, with an air compressor to supply control air located in the diesel room of the boiler house. Thermostats on the controls are designated as "Cl-1" and "Cl-2." Class 1 is an instrument which will pass air as the instrument setting is exceeded, and Class 2 an instrument which passes air as the temperature drops below the setting. Thus, two thermostats can control one valve or damper motor, passing air from the controlled side of the first thermostat through the second thermostat to the controlled device.

Thermometers are installed in the entering and leaving piping of all heating and cooling coils to provide a visual check. There are also pressure gage connections to check line losses throughout the chilled water and hot water systems.

The 17 built-up systems are made up of a mixing plenum with outside air and recirculated air passing through a hot water heating coil and a chilled water cooling coil to a supply fan. Supply ductwork to the space, plus an outside air intake hood, completes the duct layout (recirculated air is drawn directly from the truss space.)

As the supply fan is started with the on-off switch, an electric pneumatic switch is energized and passes control air to the control system. A Class 1 room type thermostat, on columns in the areas served, approxi-

mately 5 ft above the production floor, and set at 65 F, operated through a Class 1 duct type low limit thermostat located in the fan discharge and set at 55 F, modulates a three-way valve in the hot water discharge from the heating coil to maintain the temperature setting during the heating season.

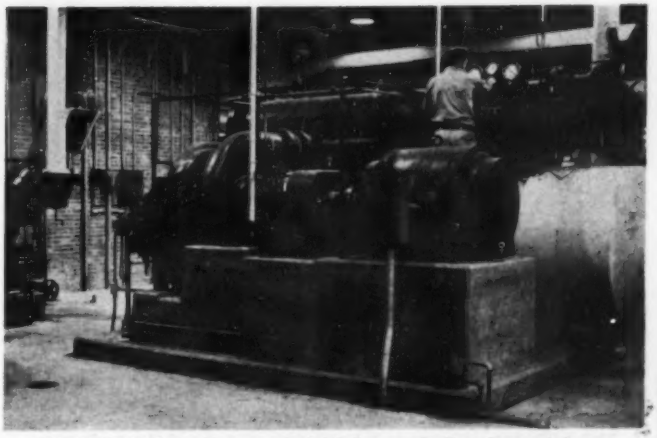
As the space temperature exceeds the thermostat setting, the room thermostat will gradually pass full air to hold the three-way in position to bypass the heating coil; the valve with the air off will pass 100 percent of the flow of hot water through the coil. The duct type low limit thermostat will — when the air leaving the fan drops below its setting of 55 F — gradually reduce the air supply to the valve, thereby passing hot water through the coil.

In the fan discharge, a submaster Class 1 duct thermostat will maintain its setting by modulating a three-way valve located in the chilled water return from the cooling coil. This valve is arranged to bypass the cooling coil when the air supply to the valve is off. The submaster duct thermostat is reset by an outside air Class 1 master thermostat as follows:

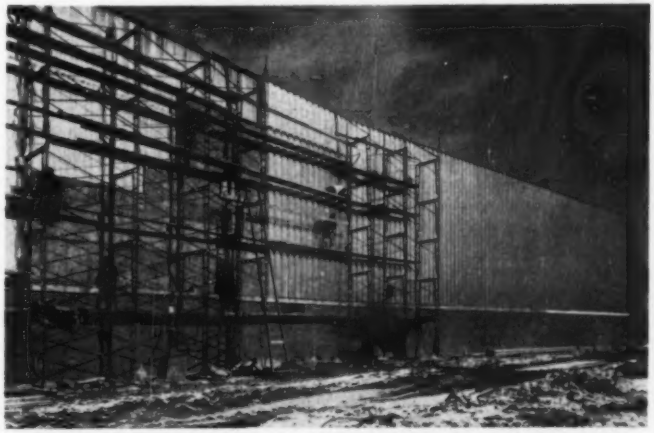
When the outside air is 75 F or less this submaster thermostat maintains its 65 F setting; when outside air is 95 F or more, it maintains 85 F. There are only two of the submaster thermostats, one for each section of the plant. A manual pneumatic gradual switch on the control panel positions the outside air damper and recirculated air damper as desired, from 100 percent outside air to 100 percent recirculated air.

The system also has an electric freeze protection control system. An insertion type electric thermostat in the outside air intake is set at 40 F, connected in parallel with an immersion type electric thermostat in the return water piping from the heating coil and set at 60 F.

These thermostats are connected through an electric relay so that if the temperature drops below the setting of either one, no change in operations ensues. But temperature drops below the setting of both instruments, simultaneously, will break the electric circuit, causing the supply fan to stop and a bell to ring. This hook-up eliminates need for summer and winter operation adjustments, and provides coil freeze protection.



THE PUMP ROOM, adjacent to the boiler house. Cooling of water is by two centrifugal compressors, one with fluid coupling (for low load operation) and another with constant speed, automatic suction damper control, which goes on the line when the former reaches its capacity output



ERECTING THE 25 ft high "breathing" steel, fiber glass and aluminum side wall. The men on the left are installing the insulating board, which is fastened to the inner steel wall panels by means of 10 ga headless welding pins, which are first installed with a stud welding gun and on which the insulation is secured with a speed clip. A section of the wall, complete except for aluminum coping, can be seen on the right, after removal of the scaffolding. It consists of aluminum panels which are secured to stud welded fasteners on the inner wall with special aluminum transition washers and aluminum acorn nuts, which are specially coated to eliminate galvanic action between the aluminum and steel wall components

Each air handling system in the plant has an outside and a fan discharge thermometer, for performance checking. At fan shutdown, the electric pneumatic switch will exhaust air from the control systems, causing all instruments to return to their normal positions — outside air damper closed; recirculating air damper open; hot water valve on heating coil to pass water through coil; and chilled water valve on cooling coil to bypass coil.

Controlling the Chilled Water for Cooling

The chilled water is cooled by two centrifugal compressors in the pump room adjacent to the boiler house. One has a fluid coupling drive; the

THE NEW $8.5 million plant in Euclid, Ohio (just east of Cleveland) is supplied with some 1 million cfm of air for heating, ventilating and cooling

other is constant speed and has an automatic suction damper for control. The former functions more economically on low loads; when its capacity is reached, the other is put on the line.

With return water temperatures dropping to 48 F or less, the manual suction damper on the fluid coupling unit should be partially closed. Water temperature leaving both units is automatically maintained at a constant temperature of 45 F. A master piston positions the automatic suction damper on the constant speed machine, it being controlled by an immersion thermostat in the leaving water.

The latter also is arranged for manual operation at will. The fluid coupling unit has automatic valve controls to change the amount of oil in the working circuit of the coupling, changing the compressor speed and unit capacity and maintaining a constant leaving water temperature. These, too, are positioned by a thermostat in the leaving water.

The following safety devices must be satisfied to keep the cooling system in operation: low chilled water temperature cutout; low refrigerant temperature cutout (in cooler;) low refrigerant pressure cutout (in cooler;) high refrigerant pressure cutout (in condenser;) low oil pressure cutout (in compressor or gear;) high oil temperature cutout (in compressor or gear;) chilled water circulation failure cutout.

Condensing water is cooled by a cooling tower, which is also used for process water.

Stoker Fired Boilers Supply 300 F Water

The hot water for heating is supplied by two stoker fired 550 hp boilers for winter use; there is also a gas fired boiler for summer and light load use, with a rating of 5 million Btu. Control for the coal fired units calls for a constant temperature of 300 F leaving the boilers. This supplies all office units, the entry building, kitchen, service area units, welding school, etc. Water at a variable temperature — dependent upon outside air temperature — is supplied to all coils and heaters in both sections of the plant.

A thermostat in the boiler hot water outlet operates through a boiler master selector valve in the control panel to control the stoker speed control drive. This thermostat also operates through an averaging relay in conjunction with a total Btu recorder to position the forced draft damper control drive as required to maintain the Btu-air flow ratio.

A temperature difference recorder in the control panel, controlled by thermostats located in the boiler inlet and the boiler outlet, operates in conjunction with a boiler water flow meter to operate a total Btu recorder to adjust combustion air flow. Both the stoker speed control drive and the forced draft damper control drive are controlled through hand-automatic selector valves. All controls are in the centralized control panel at each boiler to provide manual or automatic operation as required.

The main three-way valve controlling the water flow temperature is believed to be unique in this plant. This valve permits control from the boiler room for the entire plant so that heating is done only to the desired level.

Thermostats in the outside air and in the plant hot water header operating through a ratio controller and a hand-automatic selector valve (in the control panel), control a three-way mixing valve to modulate the flow water from the boiler discharge and bypassed return water to maintain a leaving temperature varying as to the outside air temperature according to the following schedule:

Outside air temperature 0 F; leaving water temperature 300 F.

Outside air temperature 60 F; leaving water temperature 60 F.

Walls Are of Unusual Construction

Another aspect of the installation which should be touched upon is that of the building walls. The bottom 9 ft around the plant is of brick with a limestone sill. Masonry was also carried to the roof at corners to avoid costly details of metal wall construction at such points.

But "curtain wall" is used for the remaining wall fabrication, in the place of some 3 million bricks. There was not only an advantage in speeding construction, but also in heating and cooling factors.

The wall is faced with rolled aluminum box sections 3½ in. deep, 15 in. wide and 25 ft high. The inner wall is of 1¾ in. steel panels. Between them is 1 in. glass fiber insulation. The whole is 6½ in. thick and weighs 3¾ lb per sq ft, with a heat transfer coefficient of 0.25 Btu.

The proportion of heat loss which is exhausted with the air through the roof is two-thirds. One-third is lost through the walls. The heat loss of the wall compared with what it would be with glass is one-fifth.

Open vents afforded by the box-like sections are open at the top to insure constant circulation of air and preclude moisture formation within the walls.

This new plant has undergone a full year of seasonal weather changes, and all reports are that the ventilating and heating systems operate with noteworthy success.

Estimating the Heat Loss from Slab Floors and Basements

Two formulas are presented for figuring the design heat loss, and their basis is explained

By Merl Baker, J. M. O'Byrne and A. M. Levy of the University of Kentucky

PREDICTION OF THE maximum heat loss from slab floors and basements is an uncertain evaluation. There are some experimental data; limited, however, in general, to the particular type of structure tested and the locality in which the investigation was made. The heat loss from the slab floors and basements depends upon the type of construction, the climatic conditions and the thermal properties of the underlying soil. Therefore, extrapolation of experimental data to conditions different from the test may be very uncertain.

The heat loss from either a slab floor or basement is primarily by conduction through the surrounding soil to the outside air. Because of the great mass of soil involved, the frequent outside air temperature changes impose complex transient heat flow conditions. Complexity of the conduction process renders the rate of heat transfer with respect to time very difficult to evaluate.

A sudden temperature drop of the outside air does not result in an immediate increased loss from the floor or basement. However, if the temperature of the outdoor air drops and remains lower for an appreciable time, the condition will ultimately result in an increased loss from the heated space. If the outside air temperature remains constant for a long period of time, steady state conduction will be approached. Consequently, the greatest rate of loss from the heated space occurs when the steady state condition is reached, and for this reason a computation of the design loss (the maximum anticipated) can correctly be made on the basis of steady state heat transfer. An evaluation of the daily heat loss cannot be satisfactorily made by the assumption of steady state conduction; however, the loss over a period of time is expected to be proportional to the average outdoor temperature.

The "relaxation method" for two-dimensional, steady flow conduction may be employed to approximate the temperature distribution in the soil surrounding the heated space. The boundary temperatures are taken at the inside surface of the heated enclosure and the earth-outside air interface.

Application of the Relaxation Method

Heat is conducted in a solid material along paths of least resistance between isothermal regions. For a homogeneous solid material contained between infinite parallel plane surfaces at uniform but unequal temperatures, an isothermal region is defined by a plane parallel to the faces of the solid. The temperature at any intermediate plane is proportional to its position relative to the surfaces, and for this case unidirectional heat flow exists. The direction is normal to the isothermal planes, as this is the path of least resistance. For a rectangular parallelopiped with two finite dimensions and the other infinite, two-dimensional conduction would result for unequal temperatures at the surfaces. Three-dimensional conduction would exist if all dimensions were infinite and the surfaces were of unequal temperatures. Only two-dimensional flow will be considered in this discussion.

For steady state heat condition, a zone (with its center at point 1 in the cross section depicted by Fig. 1) must lose the same quantity of heat as it receives. By considering very small zones, it is possible to accurately assume that the heat received — or lost — is conducted from the surrounding regions along the four directional lines passing through point 1. Obviously, the assumption becomes increasingly accurate as the area of the zone considered decreases. The region to be considered is bounded by *A*, *B*, *C*, and *D*, with its center at point 1 in Fig. 1. By dividing the cross section into a square grid, the zone *A-B-C-D* is also a square surface and the area through which heat may enter or leave is four times the product of a side and the length of the section.

The heat entering from the left and right along line *AA* is given as

$$q_m = [(\Delta x)/(\Delta x)]\ L\ k\ (t_5 - t_1)$$

and

$$q_m = [(\Delta x)/(\Delta x)]\ L\ k\ (t_6 - t_1)$$

respectively; where Δx is the grid dimension, L is the section length, and k is the thermal conductivity.

The heat entering from the top and bottom is

$$q_m = [(\Delta x)/(\Delta x)]\ L\ k\ (t_2 - t_1)$$

and

$$q_m = [(\Delta x)/(\Delta x)]\ L\ k\ (t_4 - t_1)$$

respectively

Dr. Baker is an associate professor of mechanical engineering at the University of Kentucky, Mr. O'Byrne is an instructor in mechanical engineering, and Mr. Levy is a graduate assistant in mechanical engineering.

For the steady state condition,

$$q_{2i} + q_{3i} + q_{4i} + q_{5i} = 0$$

Therefore,

$$[(\Delta x)/(\Delta x)]\ L\ k\ (t_2 + t_3 + t_4 + t_5 - 4\ t_1) = 0$$

or

$$t_1 = (t_2 + t_3 + t_4 + t_5)/4 \ldots . [1]$$

Equation 1 states that one-fourth the sum of the temperatures surrounding a point in a grid is equal to the temperature at the enveloped point for steady state conduction. The application of Equation 1 to establish the temperature distribution in a conducting solid is indirect, in that the temperatures surrounding the point in question must be known.

An original assumption of the temperature distribution is made, from which corrected values are obtained by use of Equation 1. The correction process is successively continued, using previously determined values until Equation 1 is identically satisfied. This ultimate goal can always be reached providing that boundary temperatures can be established. By selecting the square grid very small, irregular cross sections may be treated. It is evident that as the grid dimension decreases, a greater accuracy is obtained — but at the expense of additional computations.

Temperature Distribution and Heat Loss

The rate of heat transfer through a conductor can be determined from the temperature distribution, its thermal conductivity and surface area. The most general method is probably that of formulating the "map" consisting of the isothermal and flow path lines. The flow path lines are drawn perpendicular to the isothermal curves and positioned such that a space with approximately equal sides, curvilinear square, results. Fig. 2 shows the map for a cross section taken through the soil adjacent to a slab floor. It is evident that most of the loss occurs within the section nearest the wall, and very little heat is lost to the earth under the central part of the floor.

The map of Fig. 2 was drawn from the temperature distribution determined by the relaxation method utilizing the following assumptions: (1) soil temperature constant and at 50 F, 6 ft below ground surface, (2) floor surface temperature constant and at 70 F, (3) outside surface soil temperature constant and at 0 F, (4) uniform temperature gradient of 3-2/3 F per ft beneath the floor 7 ft from the center line of the building wall, (5) thermal properties of the floor the same as those of the soil, (6) uniform temperature gradient of 8-1/3 F per ft in the soil 7 ft away from the center of building wall, and (7) the building wall is 15 in. thick.

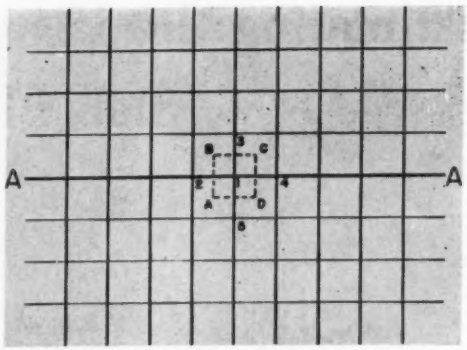


FIG. 1—IN ANALYZING THE PROBLEM, it is possible — by considering very small zones — to assume that the heat received or lost is conducted from the surrounding regions along the four directional lines passing through point 1

The heat conducted through the section depicted in Fig. 2 is obtained by:

$$q = N/n\ k\ L\ (t_{s,i} - t_{s,o}) \ldots . [2]$$

where q is the amount of heat, Btu per hr; N is the number of flow channels; n is the number of isothermal spaces; k is the thermal conductivity, Btu per hr per ft per F; L is the perimeter length, ft; $t_{s,i}$ is the inside surface temperature, F; $t_{s,o}$ is the outside surface temperature of the soil, F.

Equation 2 is applicable to spaces in which the dimensions are sufficiently large such that the corner influence is negligible. A somewhat excessive value for the heat loss will result by application of Equation 2 to small rooms with L based on the floor dimensions at the inside wall. For a given number of isothermal spaces (n in Equation 2), the number of flow channels (N) is dependent on the area of the slab. Observation from Fig. 2 reveals that almost all the heat loss from a slab floor occurs through the area of the band next to the wall. Approximately 10 times the heat is conducted through the 1 ft band adjacent to the wall as through the 1 ft band 5 ft away. By neglecting loss through the floor at distances greater than 7 ft from the wall center line, N and n become 18.5 and 23.3 respectively. A substitution of these quantities together with respective values of 70 and 0 F for $t_{s,i}$ and $t_{s,o}$ into Equation 2 gives:

$$q = 55.4\ k\ L \ldots . [2a]$$

For spaces with one or both dimensions less than 14 ft, the number of flow channels should be determined from Fig. 2 with the floor band equal to one-half the smaller dimension; otherwise, excessive heat loss values will result. Also for small buildings, high loss quantities will be calculated unless a mean perime-

HOW TO FIGURE THE HEAT LOSS

The "relaxation method" discussed in this article may be applied to evaluate the design heat loss through slab floors and from basements.

The maximum anticipated heat loss from a floor slab is primarily dependent on the floor perimeter, the thermal conductivity of the soil, the outside soil surface design temperature and the inside surface temperature. For a large uninsulated floor located in a moderately cold climate, the design heat loss is given by:

$$q = 55.4\ k\ L$$

The design heat loss (below the ground surface) from a 7 ft deep basement having uninsulated walls and floor and located in a moderately cold climate is given by:

$$q = 135\ k\ L$$

In these equations, q is the heat loss, Btu per hr; k is the thermal conductivity, Btu per hr per ft per F, and L is the perimeter length, ft

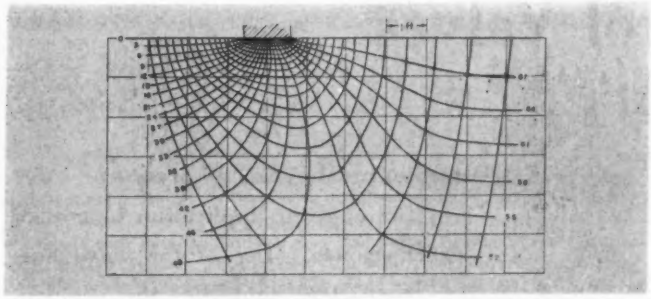


FIG. 2—APPROXIMATE HEAT FLOW lines and isothermals through the soil beneath a slab floor. (Isothermals are obtained from the temperature distribution determined by the relaxation method, and heat flow lines are obtained by the method of curvilinear squares)

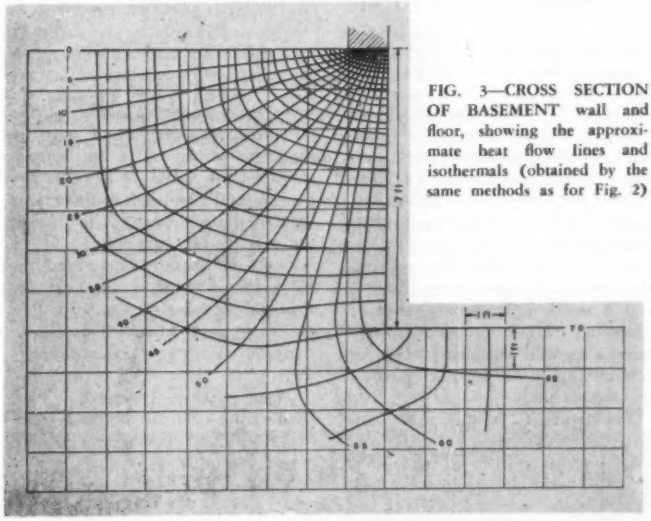


FIG. 3—CROSS SECTION OF BASEMENT wall and floor, showing the approximate heat flow lines and isothermals (obtained by the same methods as for Fig. 2)

ter is selected to correct for the corner effect. A corrected perimeter computed from the floor dimensions at the wall center, less four times the floor band width, is recommended.

The thermal conductivities of soils vary appreciably with the type of soil and the moisture content. As a prolonged cold period may prevail when the soil is wet, a design value of 1 Btu per hr per ft per F is recommended for the thermal conductivity of soils. However, when reliable data are available for a particular soil, these values should be used.

For an average soil, the following values are representative: 0 percent moisture by volume, $k = 0.2$; 15 percent, $k = 0.8$; 30 percent, $k = 1.1$.

Fig. 3 depicts the map of a cross section of a basement wall and floor. The temperature distribution shown was determined by application of the relaxation method subject to the following assumptions: (1) Wall and floor temperature constant and at 70 F, (2) outside soil surface temperature constant and at 0 F, (3) soil temperature constant and at 54 F at a 10 ft depth, (4) a temperature gradient of 5 1/3 F per ft below the basement floor 7 ft from the wall center, (5) a temperature gradient of 5.4 F per ft in the outside soil 6 ft from the wall center, (6) the thermal properties of the wall and floor the same as the adjacent soil, (7) the thickness of the building wall above the ground surface is 1 ft.

For the 7 ft deep basement depicted in Fig. 3, N and n equal 27 and 14 respectively, and for a 70 F temperature differential, substitution into Equation 2 gives

$$q = 135\ k\ L \quad \ldots\ldots\ldots\ldots\ldots\ldots [3]$$

Equation 3 includes the loss through the vertical wall below the ground level and a 2½ ft band of floor area. The loss through the floor at greater distances from the wall is neglected.

Equations 2a and 3 may be employed to compute the design heat loss from slab floors and basements, respectively, for moderately cold climates. For climates in which the assumed outside soil surface temperature does not apply, computed quantities of q may be modified in proportion to the inside-outside surface temperature difference. The design outside soil surface temperature is expected to be somewhat higher than the design outside air temperature.

R. S. Dill, W. C. Robinson and H. E. Robinson have reported [Building Materials and Structures, National Bureau of Standards, Report BMS103, March 10, 1945] on the basis of experimental data that the heat loss from slab floors depends primarily on the floor perimeter rather than the surface area. For a 4 in. concrete floor over gravel, they reported a loss of 0.81 Btu per hr per ft per F temperature difference between inside and outside air. This value was obtained as an average over a period, and agrees with a figure of 0.795 obtained from Equation 2. The favorable comparison between calculated results from Equation 2 and experimental values strengthens the equations presented in this analysis. Since the experimental value of 0.81 was determined from average outside-inside temperature differences, a modification of Equations 2, 2a and 3 in proportion to the difference between the inside surface and average outside soil surface temperature would be expected to offer a satisfactory means of evaluating the average heat loss over a period of time.

For construction materials having thermal properties different than the adjacent soil, the wall or floor may be expressed as an equivalent thickness of the soil. The solution may then proceed in the manner presented.

Sizing Control Valves

Determining the size of a control valve for a given application is not an exact science. Use of the valve flow coefficient simplifies the problem

By Ralph A. Rockwell

DETERMINATION OF A control valve's size for a given application is not an exact science. While it is premised on a full knowledge of actual flow conditions, frequently one or more of the conditions are — by necessity — approximations. It is the evaluation of this flow data, therefore, that really determines the final valve size. Common sense and experience are the prime requisites.

The use of the valve flow coefficient (C_v) materially simplifies the problem of control valve sizing. It provides a simple method applicable to a wide variety of valve constructions, valve sizes and field services. Because of its importance, an understanding of its development, scope and limitation is essential.

The valve flow coefficient is defined as the number of U. S. gallons per minute of water which will pass through a given flow restriction with a pressure drop of 1 psi. It is thus a capacity index. A flow problem involving gas, steam or a liquid can be converted to the equivalent valve flow coefficient. In other words, the flow of any fluid through a restriction with a known pressure drop may be expressed in terms of gpm of water at 1.0 psi pressure drop. This flow restriction can be an orifice plate, a length of pipe, a hand valve or, more specifically for control purposes, an automatic control valve. The C_v does not involve any specific flow restriction, but is based on the fundamental law of fluid flow [$v = (2gh)^{\frac{1}{2}}$, where v is the flow velocity, g is the acceleration due to gravity, and h is the difference in head or pressure.] All sizing formulas, slide rules, alignment charts and tables for determining valve size are based on this simple law.

For liquids, C_v is equal to the flow in gpm divided by the square root of the pressure drop in psi and is corrected for specific gravity by multiplying this expression by the square root of the actual flowing gravity. For steam and gases, the use of C_v is almost equally simple. In the gas and steam equations, suitable constants permit the use of C_v and convenient units for flow, pressure, temperature and specific volume.

Meaning of a Valve's Flow Coefficient

A control valve which has a C_v of 10 means that its effective port area (in the fully open position) is such that it passes 10 gpm of water with a 1 psi pressure drop. This is the approximate C_v capacity of a 1 in. control valve. The numerical value of C_v simply expresses the number of gallons per minute of water flow which would result from a 1 psi pressure drop.

The maximum flow capacity of a valve is a complex function of the port area, plug design and body design. Valve efficiencies are dependent upon the valve design, the flow pattern and the ratio of the port area to the body area. In view of the wide variety of designs and the extreme difficulty in determining the valve efficiency, it is generally impractical to calculate the valve flow coefficient, and capacity data should therefore be determined experimentally.

The C_v rating of a valve is specified at the rated lift or in the wide open position. Valve flow characteristics are frequently plotted in terms of lift versus C_v. The valve rating is then the C_v at 100 percent lift and the use of C_v for all other lifts is a convenient way of expressing flow at a constant drop.

Must Make Reasonable Assumptions

It should be recognized that present valve sizing procedures are based on assumptions that are not strictly valid and on theory which in many instances is inadequate. However, without the use of simplified theory and reasonable assumptions, the practical problem of sizing becomes hopelessly complicated. Although C_v is based on experimental data and makes corrections for body losses and efficiency of the port and passages, the experimental determination of its value does not take into account the variations in the characteristics of the fluids in question; nor

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does it allow for changes in the state of the fluid or the wide variations of pressure drop and velocity which may exist in various installations. It is in this region that the rule-of-thumb, based on experience and rational assumptions, is necessary.

Improved techniques and more exact determinations of the behavior of fluids under various pressure drop conditions may improve the theoretical accuracy, but the overall accuracy will still be limited somewhat by the difficulty of evaluating operating conditions.

With the exact maximum flow known, it is customary and desirable to provide a safety factor and to determine the valve size on an arbitrary flow usually well in excess of the known maximum. This excess is dependent on the operating conditions of the application, the valve size and the construction of the valve under consideration.

Exact Pressure Drop Is Seldom Known

Sizing procedures are predicated on reasonably exact knowledge of the pressure drop across the valve. In many instances the actual pressure drop used is at best only an approximation and, therefore, care must be exercised to select the average pressure drop consistent with operating conditions at the maximum flow.

While sizing formulas are based on the assumption that the flow varies as the square root of the pressure drop, there is some question as to the validity of the application of the square root law to such a complex restriction as a control valve, especially under extreme operating conditions. Except in unusual circumstances, the error resulting from the use of the square root law is seldom of sufficient magnitude to justify complicating the sizing procedure by corrections which, in many instances, may be extremely difficult to correlate to the case at hand.

The formulas for flow of steam and gases include a compressibility correction which is a function of the outlet pressure. This is an assumption which is not strictly true, as the exact correction should be some intermediate value between the inlet and outlet pressures. The use of the outlet pressure is a conservative simplification tending to underrate the valve capacity up to approximately 15 percent at the critical pressure ratio.

After the C_v has been determined, there still remains the task of selecting the optimum valve size from both the performance and economic points of view.

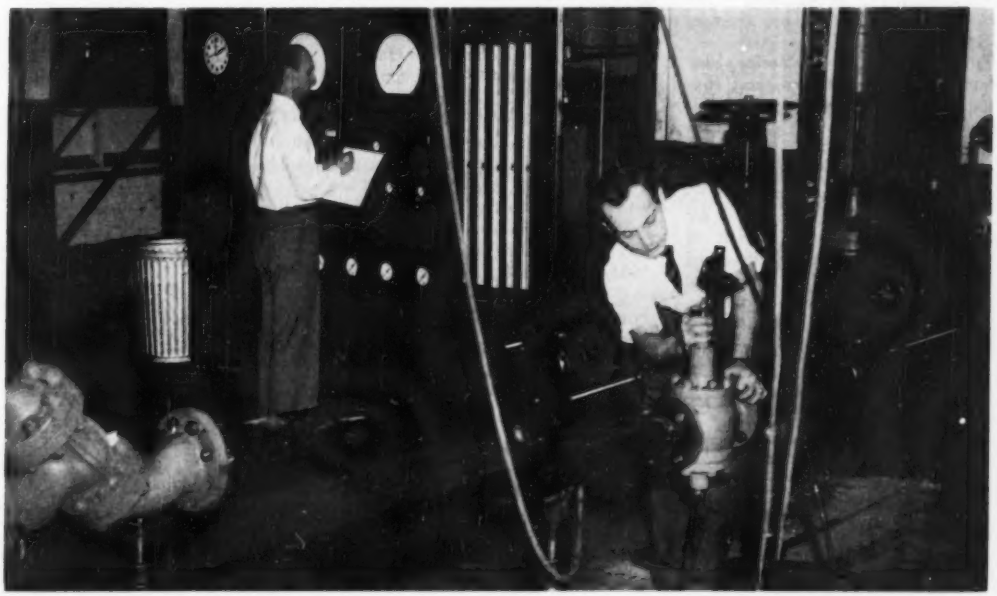
Correct Interpretation of Data Imperative

For example, if a C_v of 32 is obtained, and requirements call for a double-seated diaphragm motor valve, the choice must be made, say, between the 1½ in. size with a C_v of 30 and the 2 in. size with a C_v of 50. At this point, good judgment dictates a review of the operating data as a guide to the final size selection.

In the foregoing example, if the value of the flow used in figuring the formula included a substantial safety factor, or if the pressure drop was lower than could be reasonably expected, the use of the 1½ in. valve would probably meet all the performance requirements at a minimum cost. On the other hand, if very accurate flow and pressure drop figures were available and used without the addition of a safety factor, it would be wise to select the 2 in. size.

This "guess-timating" of the final valve size emphasizes the futility of worrying about small theoretical corrections which serve no useful purpose in the final selection of the valve.

TEST EQUIPMENT used in determining flow coefficients



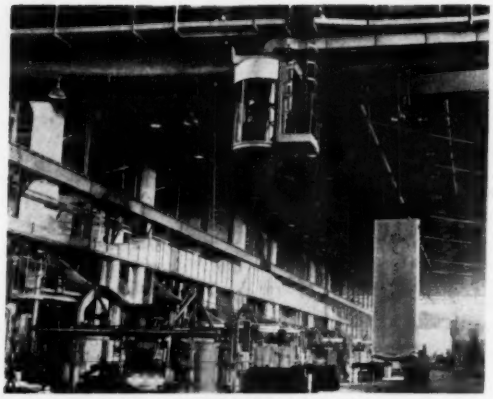


FIG. 8—EVAPORATIVE SPOT COOLING is used at the Aluminum Co. of America's Davenport plant

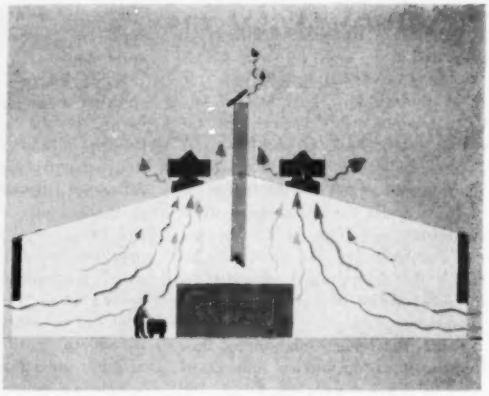


FIG. 9—GOOD CROSS VENTILATION and circulation were obtained before buildings were added

HEAT RELIEF in Industry

By Bartlett R. Small
Staff Engineer, Mechanical Engineering Dept.
Aluminum Co. of America

THE ALUMINUM CO. of America's new fabricating plant at Davenport contains our second remelt furnace building to be equipped with evaporative spot cooling (Fig. 8). It uses the split system with roof exhausters. The duct downcomers from the overhead supply duct have low level air diffusers located about 7 or 8 ft off the floor. The writer recently asked to have the supply fans shut off at this plant to see how soon the employees would complain. The chief engineer said no trial would be needed as he felt they would notice it in a minute. The air conditioned cab of rounded design, with a chair for seated operation, can be seen in Fig. 8.

This 1300 x 160 ft building is supplied with a total of 200,000 cfm of washed air in summer. In winter this is tempered to 65 F for make-up air to the various smoke, fume and dust exhaust systems in several interconnecting buildings.

Alcoa's first experience with washed air for spot cooling in typical production areas occurred in its Lafayette, Ind., fabricating plant. In 1944, a 600 x 160 ft remelting building, the counterpart of the open hearth shop, Fig. 9, was to have much of its main operating side closed by the construction of two adjoining buildings. All fresh air and cross ventilation would be closed off.

A combination of circumstances seemed to justify evaporative cooling. The resulting two 80,000 cfm systems have been in operation for seven years, delivering 65 to 80 F air from the grilles during periods when other areas have reached 100 F. The men at the casting stations enjoy a 7 mph breeze with air only 3 to 5 F warmer than back at the registers (Fig. 10). This 600 fpm target velocity is a function of the 15,000 cfm discharging at 2000 fpm grille free area velocity and the 30 ft travel that was calculated to have minimum induction of hot room air.

Another advantage is the system's ability to supply the Lafayette remelt building with the full 160,000 cfm of outside air in winter, tempered to 65 or 70 F to offset various exhaust system air losses. By reducing the building negative pressure, there are less cold draft difficulties around outside walls, particularly at truck doors. Many plants are following this make-up air practice.

The total installation cost at Lafayette amounted to $42,000 or 28c per cfm, even though the 440 ft run of outdoor duct was rather expensively constructed. The expenditure for this type of system seemed to be justified when this same plant recently sought and received authorization for a similar unit to serve a line of billet heating furnaces and hydraulic presses. The building is

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This paper was presented at a meeting of the Association of Iron and Steel Engineers, and published in the AISE journal, the Iron and Steel Engineer. It is republished here (with permission) to make the information generally available to ventilating, air conditioning and heating engineers and contractors and to engineers in plants who are concerned with these problems. The first part appeared in the October HPAC.

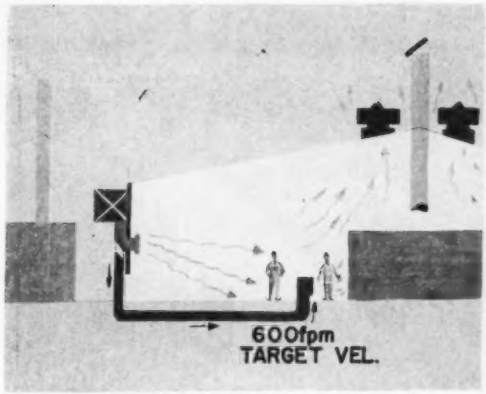

FIG. 10—MEN AT THE CASTING stations enjoy a 7 mph breeze only 3 to 5 F warmer than at wall registers

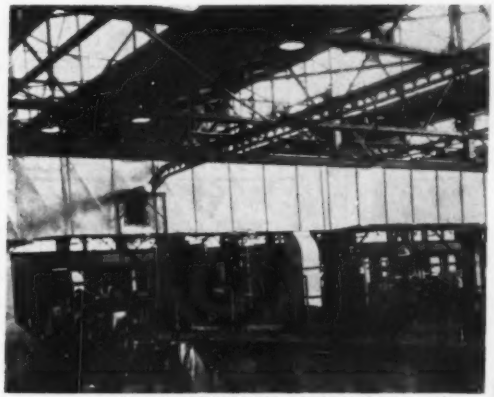

FIG. 11—THE SUPPLY DUCT, of aluminum, runs the full 500 ft width of the building

300 ft long, and the aluminum supply duct runs the full 500 ft width (Fig. 11). About 35 operating stations are served by air volumes up to 4000 cfm with a system total of 82,000 cfm.

A typical prospect for spot cooling developed in 1949 when heat conditions became rather serious in a new small foundry engaged in turning out high production of permanent mold castings. The working area had air temperatures about 15 F above that outdoors, and radiant heat measured by a black globe thermometer showed higher values.

Gravity operated 54 in. roof ventilators exhausted air from under the roof; the air was about 35 F hotter than outdoors. By adding motors and fans, ventilation was tripled and a 4½ minute air change secured, helping the general temperature level.

At the same time, steps were undertaken to provide washed air and local cooling at the casting line. Fig. 12 shows a rather carefully developed but simple design. Each man receives about 2000 cfm or less, as he prefers, at an air velocity (grille free area) of 400 to 1000 fpm, with the natural air path directed to his waistline. On hot summer days the men are free to reach up and direct any desired part of the air on their shoulders and faces, Fig. 13.

The mistake of using a fixed grille and single air path was carefully avoided because of past experience. The lack of air pattern flexibility will turn the men against any type of air supply system. As proof, there are plants today where outdoor air cannot be blown on men without hearing a chorus of complaints. In practice, unless a man can easily change the air pattern and volume at will during the day, he will fight the system instead of being thankful for it.

Incidentally, after one summer's experience, this same foundry went ahead and installed a duplicate system for another casting line. Shortly afterward, good reports from this plant led a second foundry to get an installation underway, Fig. 14.

A recognized and successful pioneer in air conditioning expressed it very well when he said in part that outside air evaporatively cooled will provide conditions which meet from a physiological standpoint all health requirements at a price not much greater than adequate ventilation. In many cases, evaporative cooling will provide conditions as satisfactory as refrigeration, and in every case safety from unfavorable reactions.

Alcoa has an aluminum producing plant in Texas that receives 120,000 kwhr from 120 generators driven by

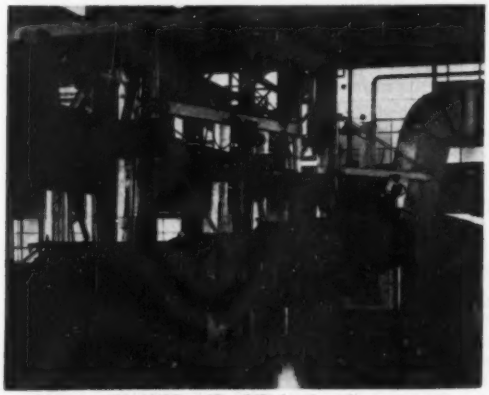

FIG. 12—WASHED AIR AND local cooling were provided at the casting line, as indicated

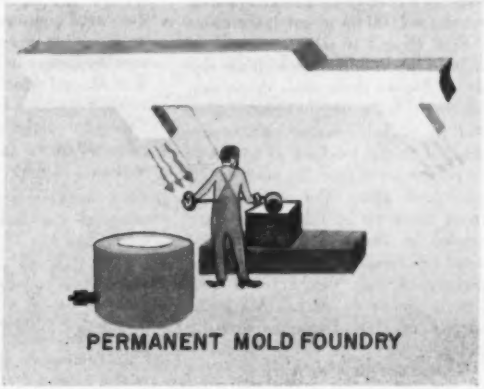

FIG. 13—THE MEN ARE FREE to reach up and direct the air as desired on their shoulders and faces

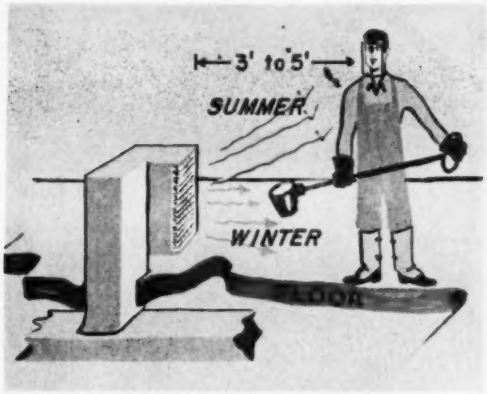

FIG. 14—AN IDEAL arrangement for maximum cooling efficiency and adjustments

FIG. 15—EVAPORATIVE COOLING is used for operating floor of a plant with 40 gas burning engines

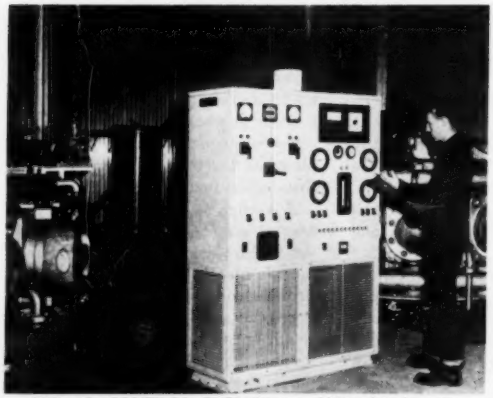

FIG. 16—CONTROL CUBICLE in middle aisle has air grilles on three sides down near the floor

natural gas burning, radial engines. There is a story here about the measures taken to keep the three engine buildings relatively comfortable while 40 hot engines are each turning out about 1600 hp in one large room.

Figs. 15 and 16 show a control cubicle in the middle aisle with air supply grilles on three sides down near the floor, from which about 10,000 cfm of cooled, washed air is distributed in the working area around its respective engine. To assure good conditions along the outside wall areas, three air grilles are similarly located in the enclosed supporting stand for the oil filter that serves each engine. An air discharge of 6000 cfm is delivered here. All grilles operate at 1000 fpm free area velocity.

Grilles are thus delivering 16,000 cfm of pleasant air motion at 1000 fpm grille effective velocity over the 20 × 27 ft floor area given to each engine. Everyone is very pleased with the degree of heat relief obtained.

Incidentally, the 35,000 cfm air washer for each engine is also efficient as an air filter, using durable aluminum media in each scrubbing cell. Of this air volume that enters the continuous basement, 13,000 cfm is drawn through the 1000 kw generator windings and 6000 cfm by the scavenging air blower. This is a further application of considerable size based on a design that originated in an earlier group of engine buildings the company built during World War II, and which were equipped in a similar though less refined manner. This pilot plant approach is almost essential in the initial stages of spot cooling practice.

In closing this paper, a brief summary of reasonably safe procedure would be:

1) To look for every means to effect radiant heat protection in the area under complaint, a sort of "heat control housekeeping." Shield or paint every surface over 200 F.

2) To ascertain if good roof ventilator or roof monitor practice and performance are being followed.

3) To spot cool with washed air those local areas in conjunction with the other two operations when more drastic relief is needed.

The only safe procedure is to learn to crawl before trying to walk, and the starting point should be small installations in several different plants. The results will speak for themselves and the stage will be set for heat relief when plans for a new plant shape up.

As a final word of caution, it is well to bear in mind that the adaptation of radiation control and evaporative spot cooling for various industries involve techniques that are still in the development stage. More important still is the lack of a good yardstick to predict whether an installation will be a success, for what satisfies one superintendent may not satisfy another. Furthermore, it should be remembered that no professional field is more subject to wide personal interpretation than is ventilation and heat relief.

[The discussion on this paper will be published in a following issue.]

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DATA SHEET

Duct Access Through Beams

By Walter A. Stahl, Operating Manager, The Merchandise Mart

THE PRESENT architectural trend in both office and display spaces is to get away from ceiling projections caused by furring enclosing ducts, beams, etc.

While in this case one is usually content to have a lower overall ceiling height than would otherwise be obtained between ducts and beam furrings, it is still desirable to maintain a height of close to 9 ft. This is often very difficult, as even with floor-to-floor heights of 12 ft. in some cases girders may be as deep as 24 in.

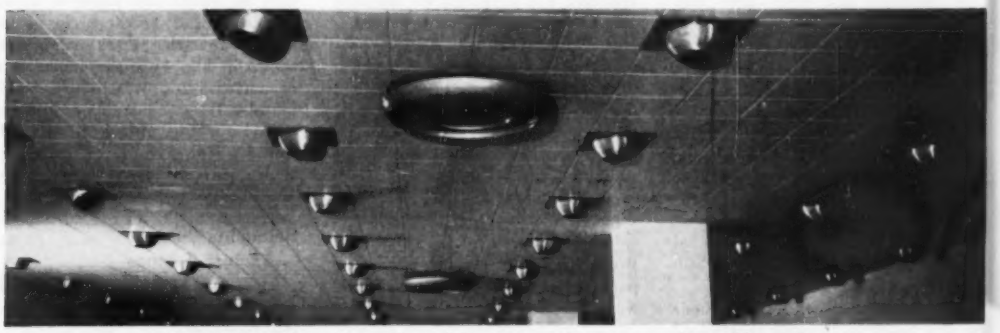
As a part of the original duct layout in the United Nations building at New York, all of the trunk ducts were routed through the middle or web of the large girders on various floors.

On a recent job at the Merchandise Mart, in Chicago, there was a 24 in. girder below the regular floor construction which would have reduced the ceiling height at this point to 8 ft.

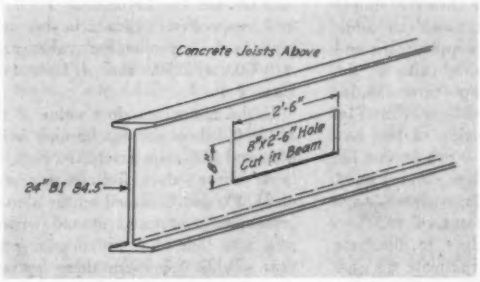
By cutting three holes through the web section of the beam, it was possible to maintain the ceiling height and still use ducts of 8 in. depth. In two of three holes cut, it was not necessary to reinforce the beam; however, on one of the wider holes it was necessary to reinforce the beam with angles and plates as shown.

Cut Holes Between Quarter-Point and Center

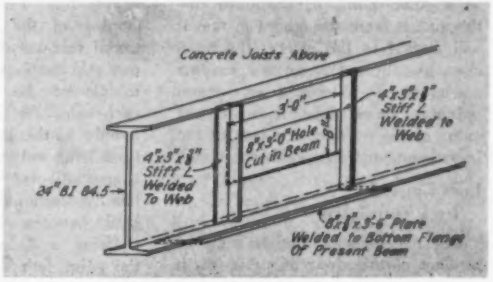
In general, assuming uniform loading above the beam, it is preferable to cut holes between the quarter-point and the center of the beam. The holes should be cut along the neutral axis of the beam, and should not be more than one-third of the depth of the beam in the vertical dimension.



THE MODERN TREND in office and display spaces is to get away from ceiling projections caused by furring enclosing ducts, beams, etc. Here's a recent installation in tenant space in the Merchandise Mart, showing concealed ductwork with modern outlets



BY CUTTING HOLES in the web section of a beam, it was possible to maintain the desired ceiling height and still use ducts of 8 in. depth


Concrete Joists Above
3'-0"
4"x3"x⅜" Stiff L Welded to Web
8"x3'-0" Hole Cut in Beam
4"x3"x⅜" Stiff L Welded To Web
24" BI 84.5
⅜"x3'-6" Plate Welded to Bottom Flange Of Present Beam

IT WAS NECESSARY TO REINFORCE the beam with angles and plates for one of the wider holes. This wasn't required in two cases

Process Piping Shutdowns

. . . . . can cost a lot of money, in several ways. Here's how to estimate such losses and whether or not the cost of improvements is justified. Piping inspection suggestions are also given

By A. C. Kirkwood

A. C. Kirkwood & Associates
Engineers and Consultants

TOO OFTEN, valves are counted as luxuries during the design and erection of a process piping system. Many are, perhaps, but let us look into this matter to see where valves are necessary and why. Let's consider a typical problem.

The steam line supplying the kettles in a certain department at a plant is a typical installation — a gate valve at the branch from the main header supplying various plant departments, a run of pipe passing all kettles with a branch to each. The individual kettle lines contain the regulating valves and a shut off valve of the gate type. Failure of one of the kettle valves (gates) will involve service to all kettles.

What improvements can be made to this layout to increase reliability? What changes should be considered to insure minimum outage time?

Several methods are available, each with some point of merit to distinguish it from the others so that it will appeal to the owner, the manager, the operator, or the maintenance man. Where these several opinions focus depends upon the value of the product, the cost of the investment, and the results obtained.

Loss Caused by a Shutdown

The management advises that the product of this department is worth A dollars per year to the company based on their intended operating schedule of 6000 hr per year.

Obviously a shutdown of all kettles for 1 hr means a loss of $A/6000$ dollars and a 4 hr shutdown means a loss of $(A\times4)/6000$ or $A/1500$ dollars. Suppose only three kettles were shut down during the 4 hr repair period — then the loss would be cut to $A/3000$ dollars. Likewise the loss would be reduced to $A/4500$ if only two kettles were cut out during repairs, or $A/9000$ if only one kettle was shut down (see Table 1).

How Piping Layout Might Be Changed

Fig. 1 shows the existing steam supply line. Fig. 2 shows a simple looping of the line with an additional valve at the supply main and a single sectionalizing valve in the middle of the loop—three kettles each side. Fig. 3 differs from Fig. 2 only in the inclusion of two sectionalizing valves — two kettles between adjacent valves, and Fig. 4 has five sectionalizing valves — one kettle between adjacent valves.

Using a 3 in. line to illustrate the point, let's approximate the cost of improved reliability. The piping shown in Fig. 1 is required and the added cost for improvements shown in Fig. 2 might be approximately $220, including valves, butt welding flanges, pipe, welding turns, insulation, labor, etc. If the layout of Fig. 3 is preferred over that of Fig. 1, then the added cost might be about $255. Similarly, $360 might be required for the extra equipment shown in Fig. 4. If the annual rate of amortization, or write-off, is 20 percent, the annual dollar write-off is $44 for Fig. 2, $51 for Fig. 3, and $72 for Fig. 4. [The dollar values used are merely for purposes of illustrating the method.]

Balancing Cost Against Savings

Assuming an average of one 4 hr shutdown per year (to maintain the frequently used gate valves in the lines to the kettles) it is seen that the lost production value is $A/1500$, $A/3000$, $A/4500$ and $A/9000$ for the layouts of Figs. 1 to 4, respectively. Similarly the savings in lost production value are $A/3000$, $A/2250$, and $A/1800$ for Figs. 2 to 4.

If the annual product value A is $135,000, these savings become $45, $60, and $75 respectively for Figs. 2 to 4. These values, indicate a profit of $1, $9, and $3 based on the above investment costs and annual write-offs with one 4 hr shutdown per year. Table 2 contains these figures as well as the value of the savings when the product value is $90,000 and $180,000. It should be noted

Mr. Kirkwood is a member of HPAC's board of consulting and contributing editors.

that procedure under Fig. 3 is the most desirable, that Fig. 4 procedure is almost as desirable (financially), and that Fig. 2 presents an attractive picture.

It is obvious that the value of the product and the size of the lines must be considered in determining the correct extent of service insurance to be added to the existing equipment. There are other factors that must be considered, too.

Table 2 has been prepared on the basis of one 4 hr outage per year. If the valves to the kettles are subject to very frequent or none too careful operation, or if they are by any chance used as regulating valves, the possibility of valve trouble is increased. Likewise, if the line carries fluids or vapors whose corrosive or erosive action is greater than that of steam, then increased valve trouble should be expected. The table is based on a 20 percent rate of write-off. If this rate is changed, then the value of the added investment is likewise changed.

Other items that may or may not have simple dollar values are the possible loss of product, the loss of employee time, the contingent loss due to delayed orders, and the very nature of the product and plant. Any or all of these latter items may be sufficient to justify greater piping reliability.

Usually the looping of a supply line or header will permit reduction of pipe size and thereby decrease the cost of the added protection.

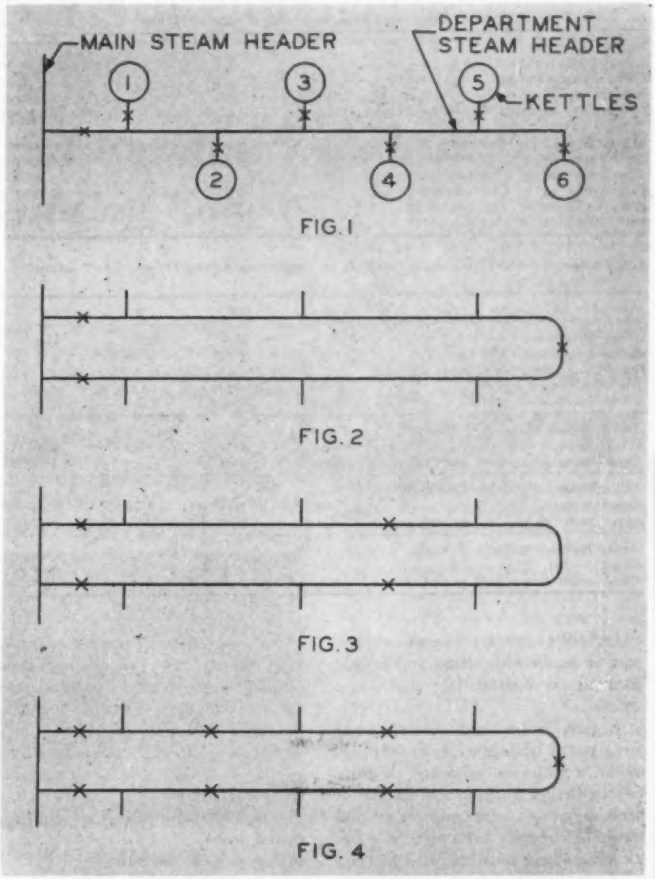


FIG. 1 SHOWS the steam piping layout for six kettles and the other sketches indicate how the department steam header might be looped and sectionalized to avoid shutting down all the kettles when maintenance work is necessary

Determining Amount of "Operating Insurance"

Each plant or department should be analyzed for requirements of output as to value, continuity of operation, cost of lost time and other factors. With these facts in mind a few simple calculations will serve to determine the amount of operating insurance to be installed in the form of headers and sectionalizing valves.

To summarize the example, suppose the plant operates 6000 hr a year with all six kettles and on average market prices the department has a product value of $225,000 per year. A 4 hr shutdown is worth $150 in product alone. If this can be reduced to $50 by cutting the header into three pieces with a supply at each end, a big saving is made.

Say that the valves and the pipe, fittings, and labor cost about $255. Assume the accountants say 20 percent of that is charged off each year, or $51. If there is only one shutdown a year, $50 instead of $150 in product value is lost and it costs $51 for the investment — $101 as against $150, or a profit of $49 per year. Better yet, the plant's orders get out on time because only two kettles are down instead of all six, and the men are not idle those four hours.

Regular Inspections Prevent Shutdowns

Regular inspection schedules of plant piping are also important in preventing shutdowns and delays, so while we are on the subject, let's also discuss them briefly.

Inspection falls into two classifications: (I) Inspections possible regardless of time, (II) Inspections requiring prearranged periods of time when lines and equipment can be taken out of service for detailed inspection.

In the latter case, inspectors checking equipment, electrical devices and wiring, and structures should be working on the same equipment at the same time. This will prevent duplication of outages for inspection. Repair parts, equipment, and material that may be required should be available without delay.

TABLE 1—LOSSES FOR various outages based on product value

Number of kettles	6
Annual product value	*A*
Hours operation per year	6000
Loss per hr, all six kettles	*A*/6000
Loss per hr, one kettle = 1/6 (*A*/6000)	*A*/36000
Losses for 4 hr Outages	
One kettle out = 4 (*A*/36000)	*A*/9000
Two kettles out = 2×4 (*A*/36000)	*A*/4500
Three kettles out = 3×4 (*A*/36000)	*A*/3000
Four kettles out = 4×4 (*A*/36000)	*A*/2250
Five kettles out = 5×4 (*A*/36000)	*A*/1800
Six kettles out = 6×4 (*A*/36000)	*A*/1500

TABLE 2—SAVINGS made possible by improving piping layout. (*A* = annual product value)

Fig. No.	1	2	3	4
Added Investment	$ 0	$220	$255	$360
Annual amortization, 20% rate	$ 0	$ 44	$ 51	$ 72
Cost of 4 hr shutdown to repair defective valve in line to a kettle	*A*/1500	*A*/3000	*A*/4500	*A*/9000
Savings	None	*A*/3000	*A*/2250	*A*/1800
Annual Product Value A = $90,000				
Annual savings	None	$ 30	$ 40	$ 50
Annual excess savings over amortization	None	—$ 14	—$ 11	—$ 22
Annual Product Value A = $135,000				
Annual savings	None	$ 45	$ 60	$ 75
Annual excess savings over amortization	None	$ 1	$ 9	$ 3
Annual Product Value A = $180,000				
Annual Savings	None	$ 60	$ 80	$100
Annual excess savings over amortization	None	$ 16	$ 29	$ 28

Let's first consider inspections that can be made while lines and equipment are in operation.

Joints —

Inspect flanged and screwed joints for signs of leakage while under operating conditions. Record leaking joints, listing location and nature of leak, type of joint, pipe size and probable repair parts needed. Determine where possible cause of leak, such as misalignment, temperature stress or working of line, loose bolts, failure of gasket, failure of threads, corrosion, erosion, etc. If any of these causes are apparent and represent abnormal conditions, so note and where possible suggest specific remedies to prevent future failures.

Weeps in flanged joints may be stopped by carefully drawing up the bolts where such procedure is indicated clearly.

Valves —

Where operations will permit it, all stop valves should be tested under operating pressure and temperature to determine tightness, travel, ease of operation, etc. List apparent deficiencies and suggested repair materials required.

Regulating valves should be checked for functional operation, operating characteristics of valve controls or auxiliaries, including limit switches or stops. As to functional operation, operating or process records and process operators should be consulted. Record should be made of both operating deficiencies and desirable changes in characteristics. Special tests should be made if necessary to determine proper operation.

Check handwheels and look for gland leaks.

Hangers and Anchors —

See that pipes hang true to grade and line, without excessive sag at any point. Spring hangers should be checked for proper spring compression and freedom of action. Anchors should be checked for signs of slippage or failure.

Insulation and Painting —

Deteriorating insulation should be replaced or repaired. Painting should be touched up or redone where needed, particularly where painting is used as partial or complete designation of line contents. Designative stencilling should be redone if necessary.

Inspections that must be made while lines or equipment are out of service will be considered next. Repairs should be made coincident with inspection, if at all possible.

Joints —

Where previously examined leaking joints need repair, they should be checked for contributing causes such as misalignment of flange faces, breathing of lines, imperfect materials and so on. Remedy the cause where possible, or make provision for proper remedies at an early date. Bad joints should be repaired along with the valves in the same part of the system.

Valves —

Obtain and study the record of valve troubles found by inspection made while valves were in operation. Isolate valves and equipment to be inspected and repaired, having first obtained clearance from the production department and made the proper cooperative arrangements with other maintenance crews.

The following comments apply to nearly all valves. Specific suggestions are given for particular types of valves.

Leaking valves should be checked for the cause of leaks. Many leaks are caused by improper operation. For instance, hot valves shut off where the stem is on the cold side will often leak after the stem has cooled and contracted unless the cooled valve has been shut further. In this case, repair the valves and educate the operator.

Foreign materials of an abrasive nature ruin seat and disc surfaces very quickly. Unless the fluid has to carry abrasives, they should be eliminated by cleaning the lines or by installing strainers or filters. Renewable disc or regrinding type valves should be repaired in place. Other types should be repaired either in place or in the shop by the use of special tools and trained men. Most reseating operations on gate valves should be done by the manufacturer.

Regrinding should be done before small blemishes have had an opportunity to become pronounced. Composition or soft alloy discs should likewise be replaced before the seats have eroded. Screwed-in seats or discs should be checked for leakage behind the threads, as should those with rolled or pressed-in rings.

While there is the opportunity, look for stem troubles such as corrosion in the stuffing box area, galling of threads or other sliding surfaces, and eroded back seating surfaces. Packing should be examined for condition and any unfit for further service should be replaced. Packing re-

[*Concluded on page 108*]

When's Industrial Building Exempt from Building Code?

THE POSITRON Chemical Corp. [the name is disguised] decided to erect an office building for its engineering department. During progress of the work it was found that the heating, piping and air conditioning systems designed for the structure — to say nothing of the plumbing — would be seriously affected as to their installation and cost if subject to the county building code regulations.

The corporation therefore obtained a court order restraining the county authorities from making the work so subject. When the order was dismissed, the corporation appealed. Positron asked the state supreme court formally to declare that the building was to be used for *industrial* purposes and for that reason it was exempt from all provisions of the county code.

Confronted in the supreme court with the state law under which the local code was formulated, the chemical corporation argued that the statute was aimed at weakening their common law right to the unhampered use of property, and therefore should be *strictly* construed. The county, on the other hand, maintained that such statutes were designed to promote public health and safety, and that accordingly the statutes should be construed *liberally*.

"We think," said the court, "that neither of these so-called rules of 'strict' or 'liberal' construction are of much aid" in the present problem. Conformity with the *policy* of the statute should be determined, the judges opined.

The court saw a rational explanation of the exemption of properties used for industrial purposes. Such exemption, says the court, is designed to *favor industry and thus attract it to the area* in question — on the theory that industrial growth would benefit the county. "With this policy of the legislature in mind, it requires no effort to reach the conclusion that the same policy directed the exemption of property 'used for industrial purposes' from the operation" of the county codes. A reading of the codes indisputably shows that relief from their manifold regimentation, inspection and permit necessities would be a "favor". Furthermore, the permit fees in this particular case would come to no less than $7,861.50. Since exemptions in general are evidently intended either as an inducement or the conferring of a favor, the court views this "established legislative policy" as "behind the exemptions" here cited.

The Statute Lists Exemptions

The statute referred to by the court lists five exemptions, of which only two are pertinent here:

a) Properties used for industrial purposes.

b.) Properties built by industrial concerns for the use of their employees and not for sale.

Positron Chemical claimed exemption under both of these clauses. This brought on a "war of definitions." The corporation asserted that the adjective "industrial" means "having to do with, pertaining to, relating to or connected with production, industry or manufacture of commodities". As such, Positron averred, the adjective has a sufficiently broad meaning to embrace any property of an individual concern used in *connection with its business generally*.

The county authorities contended, on the other hand, that the adjective "industrial" is synonymous with "manufacturing" and that the exemption covers only buildings actively used in a manufacturing process. The county insisted that "only *factories* are included" in exemption (a).

The court took cognizance of the fact that Positron manufactures and sells chemical products throughout the United States and in foreign countries. "Generally speaking," Positron is "engaged in the industrial chemical business," the conduct of which makes it essential to provide laboratories, factories, warehouses and *office buildings* for the use of its executives, clerical, technical and other employees. "Functions performed by its employees of all categories are each indispensable and indissoluble" from Positron's activities in the chemical industry, the court declared.

As for the particular structure involved in these proceedings, evidence showed that it was not for sale — thus conforming to exemption (b) — but was intended, as had been stated, for use by the corporation's engineering department.

The scope of the exemption, asserted a majority of the court, could not be determined solely by reference to the dictionary. "We are faced with the necessity" of truly understanding the exemptions — of *construing* rather than just defining. Hence we must "give the statutory words a reasonable and sensible meaning in the light of their intent and purpose."

Following this thought-line, the higher tribunal saw nothing in exemptions (a) or (b) as conflicting

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William Hurd Hillyer, author of this article, is a contributor to a number of banking and financial publications and has written several books on business. A former vice president of the Atlanta Trust Co., his work there gave him a practical legal background.

with each other or with the contentions of Positron Chemical. The court ruled that the two provisions, when taken together, *exempt all* the properties of an industrial concern *used in the furtherance of its general business*, regardless of whether the use of a particular group is [or is not] indispensable to the company's industrial activities; or whether its use is designed *indirectly* to further the corporate welfare. Consequently, the supreme court ruled that Positron was free to proceed in housing its engineering department without being subject to the county code.

"Industrial" the Key Word

Differing from the majority ruling in this case, one of the supreme court justices lacked enthusiasm for the word "industrial", as understood by his colleagues. He labelled this the "key statutory word", and thought the specific question was whether it was here used in a narrow sense (simply relating to manufacture) or in a sense much broader, "including all the allied and incidental activities in which a manufacturing concern may engage." This dissenting judge inclined to the latter view, which involved a *liberal* construction of the statute. Courts construe laws for health and public welfare liberally, he reminds us.

"The proposed use of this building," the minority opinion continues, "is for offices. . . . An office building is not one used for *industrial* purposes." Because there was an intention to help industry to some extent, "it does not follow that the intention was to help industry to the very limit of possibility." Furthermore, "what is or is not indispensable to a business lacks any quality of objective certainty."

So much for the learned justices at both ends of the bench. The prevailing and determining view, which will affect subsequent decisions, is that buildings generally, erected by industrial concerns for use in their business and not for sale, are exempt from local code provisions.

[Note: While this discussion applies to an actual case, it should be remembered that legal rules vary in different states.]

HOW DO YOU HEAT AND COOL THE CARS IN A DRIVE-IN THEATER?

If you don't have the answer to one of your problems, chances are someone else does — or can be helpful on part of it. That's the purpose of HPAC's Question of the Month "idea exchange," where questions on heating, piping and air conditioning are asked and answered.

You are invited to contribute a question for publication, or an answer to a published question. . . . . Please address your reply to the Editor, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2.

Here is a question asked by a reader. Can you help him out?

"Several years ago, I read an article on the heating and cooling of automobiles in a drive-in theater by means of a circulated hot and cold water system to the base of the speaker stand at each car. A coil and blower in the stand supplies air to the car through a flexible tube, I believe.

"A customer has asked for a figure on heating for cars in a drive-in theater. Any information on the method — especially data on actual installations — would be most appreciated."

PROCESS PIPING —

[*Continued from page* 106]

quiring excessive tightening of the gland bolts or stuffing nut may cause undue strains on the stem threads. Such packing should be replaced by more suitable material.

Cold steam valves when warming up may leak some water until they are hot. Valves with stainless steel stems and carbon packing should be watched for stem corrosion if moisture can get into the packing.

Check valves should be examined for freedom of operation as well as the condition of seating surfaces. When closing valve bodies, see that bonnet gaskets are in good condition and that bolts are properly tightened.

Operators and Controls —

Valve operators and controls found in unsatisfactory condition during operating tests should be repaired. Limits should be checked for accuracy. Moving parts should be examined for wear. Lubricating devices should be checked to see that lubricating oil or grease is reaching all parts.

Alignment and Supports —

The cases of misalignment should be corrected by such means as are necessary. This is particularly true where such lack of alignment causes undesirable strains on pump and equipment connections. Supports that could not be worked while lines were hot should be repaired, replaced or added (as the case may be).

Miscellaneous —

Minor improvements often are desired by the plant operating departments. These improvements should be installed (if at all possible) while lines are out of service for inspection or repair.

FRANKLIN INSTITUTE HONORS SCIENTISTS

THIRTEEN MEN of science from the United States and abroad received last month world-famous medals awarded by the Franklin Institute. The presentation ceremonies took place in the institute's Franklin Hall, Philadelphia.

Among those honored are Albert J. Williams, Jr., associate director of research for Leeds and Northrup, who received the John Price Wetherill medal for his invention of the "Speedomax" self-balancing recorder, and Fred N. Severud, consulting engineer, who was given the Frank P. Brown medal for his many engineering accomplishments in the field of building construction.

QUESTION OF THE MONTH

Here's a Method of Supporting Insulated Piping

THERE APPEARED IN A recent issue of HPAC a question from a reader associated with a well-known firm of architects and engineers, asking for advice on hanging insulated pipe (or insulating hung pipe).

The basic question on the selection of methods of hanging or insulating piping is the relative one of heat loss. If moderate temperatures are involved and the heat loss through metal-to-metal contact of pipe and hanger is not significant, the hanger ring or clevis can be applied directly to the pipe and insulation applied around it. If heat conduction through the hanger is not desired, then the method described in the following paragraphs is recommended. This method has previously been described in HPAC, but would seem to bear repeating because of the question being brought up by a reader.

The load bearing tests were made with 85 percent magnesia. The same data would not apply to other types of insulation, some of which could not be employed with this technique because of their compressibility.

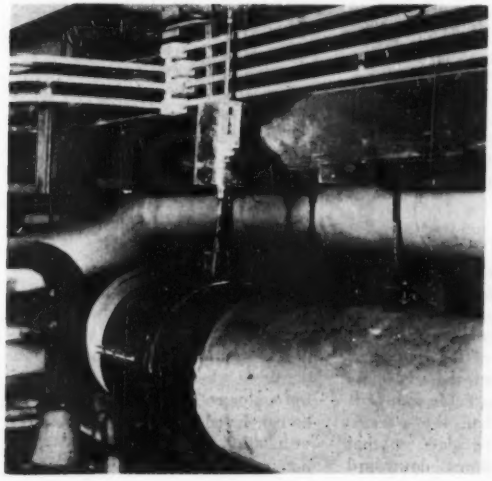
In this type of installation, developed by Sargent & Lundy, engineers, from test work done at the University of Illinois, the entire length of piping is insulated in the usual manner and then supported by hangers or by channel irons.

Where the piping is to be supported by a hanger, a No. 10 ga steel plate, its length proportioned to the load to be carried, is rolled into a band to fit the insulated pipe and provided with a flange for assembly. A saddle plate, 3/8 in. thick, is then tack welded around the lower half of the flanged band, to assist in carrying the direct load and in spreading it over a wide area. The unit is then bolted in place around the insulated pipe, a filler bar is fitted over the upper half of the flanged band, and the usual hanger strap is fastened around the entire assembly.

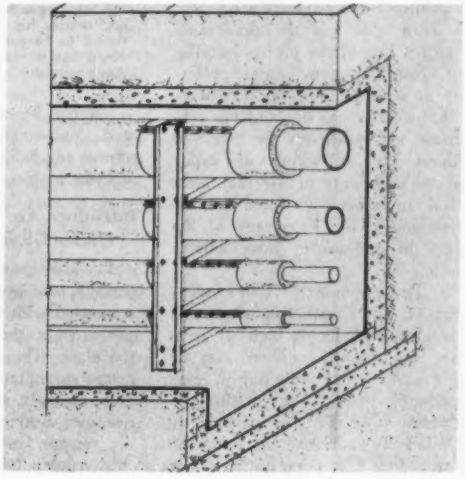
Where the pipe line is to be supported by channel irons, a 16 ga sheet metal band, 18 in. long and flanged for assembly, is bolted around the insulated pipe at each point of support.

Since the pipe rests on the insulation at the supports, the insulating material used must be able to bear the weight of the pipe. On the basis of the tests conducted at the University of Illinois, a loading capacity of 10 lb per sq in., or 100 lb per running in. of line, has been established for 85 percent magnesia pipe insulation.—MARSHALL F. ALLEN, Magnesia Insulation Manufacturers Association.

SPECIALLY DESIGNED pipe hanger on main steam line at a central power station. The weight of the pipe rests on the magnesia insulation



PIPING, INSULATION, bands and channel supports, as installed in underground conduit at the University of Illinois



SAM LEWIS' PAGE

"Some of My Friends May Wish To Argue With Me"

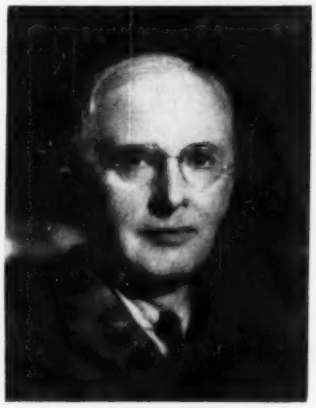
I WAS CALLED UPON a few days ago for professional advice concerning the generally desirable procedure to follow in the design of the heating and refrigerated cooling (air conditioning) of a very large educational project. There will be many different buildings, some of them of great size. Their purposes include offices, drafting rooms, and highly specialized shops.

Here are a few of my recommendations. I'll bet that some of my friends will consider them controversial, and I'd be glad to hear from any of them who may wish to "argue" with me in print.

1) Since steam is the basic heat transmitting agent in this plant, use it at low pressure only in the convectors and converters — *not* at pressures exceeding 10 lb at the most. This is because of difficulty in air venting and because unless the air is well vented, rapid corrosion of materials such as the piping may result.

2) Employ thermostatic and float traps, as occasion may demand, for all points of communication between the steam side and the condensate or return side of the piping installation. Install vacuum pumps, preferably at strategic outlying locations, to the end that the air and the condensate will positively be removed without the outleaking of vapor and the inleakage of air that must attend an attempt to force out the objectionable air by means of the steam at pressures above atmospheric.

3) Be temperate in the employment of air distributing duct systems at noise-inducing high air pressures and velocities. There may be an excuse, when installing a new ventilating plant in an existing department store, for the expenditure of relatively enormous fan power so as to reduce duct sizes, but in a new building, the cost of fan power that must persist indefinitely and the investment cost of noise silencers — that do not always silence air noises — should be most carefully evaluated. Maintenance and sanitation of screens and baffles and fibrous linings of these mufflers may prove difficult.



SAMUEL R. LEWIS, consulting mechanical engineer and a member of HPAC's board of consulting and contributing editors, comments informally each month on practical heating, piping and air conditioning problems. He summarizes here some of his recommendations for heating and air conditioning a large educational project, invites his friends who may so desire to "argue" with him in print about any of the points they consider controversial

Introduce Air Under Glass Areas

4) Glass surfaces, in winter especially, can become relatively cool, compared with the average air temperature in the room enclosed by the glass. The air of the room that comes in contact with the cool glass must contract, and a cubic foot of it becomes heavier than the warmer air remote from the glass, so that this cooler air flows downward along the glass and spills out into the room at the floor below the glass.

Consider that extra heat may be applied in this zone from below the window, by conventional convectors or by radiators, or by radiant hot water coils in the floor near the wall or in the wall itself. Baseboard type heat along the wall has favorable devotees. Warm air from a duct served by a fan and introduced vertically through the projecting baseboard close to the floor can accomplish helpful service in reducing draft complaints from windows.

Considerable temperance or judgment as to velocity will need to be applied, however, if refrigerated air is introduced in this location during hot weather. I have quieted many recalcitrant observers by increasing the velocity of the cool air so that it is compelled to diffuse out into the room above head level rather than to spill gently over on the floor and frighten nylon clad ankles.

VENT AIR, DRAIN CONDENSATE FOR GOOD HEAT TRANSFER

CAREFUL ATTENTION must be given the venting of air and the draining of condensate for maximum performance of industrial heat transfer equipment, said Richard G. Lubinsky, manager of the fan and blast coil sales department of the Trane Co., in a talk at the seventh engineering conference of the Technical Association of the Pulp and Paper Industry. Air in a system will lower heat transfer capacity — and the presence of condensate standing within the tubes is one of the greatest causes of excessive corrosion in heat transfer surface, he said. Tube rupture due to freezing, excessive water hammer and unequal expansion can also result from trapped air and condensate, he stated.

Mr. Lubinsky said that particular attention should be given to pitch of coils, size, type and number of traps required, type of heating coil, selection of controls and expansion room for tubes when installing heat transfer equipment. And in the long run, he concluded, a carefully engineered installation will prove the most economical.

Heating, Piping & Air Conditioning

THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

JOURNAL *SECTION*

Pressure Loss Characteristics of Small Diameter Round Duct Systems

By G. R. Whitnah* and J. V. Borry,** Minneapolis, Minn.

SUMMARY — Heat carrying capacities of 4 and 4½ in. duct, such as are used in small diameter duct systems for residential warm air heating, were determined by tests. Resistances of typical fittings used in these systems were determined and are expressed in equivalent length of duct. Corrections of heat delivery and air flow for temperatures other than standard may be made by charts showing multipliers to be used.

THE GROWING popularity of the small diameter forced warm air duct system for residential heating applications has precipitated a need for simplified design data to aid the design engineer in laying out systems of this type. The multiplicity of duct and fitting designs and combinations precludes any attempt to conduct an experimental program covering the entire current field. This paper is therefore limited to the testing and analysis of one type of complete duct work system which was regarded to be representative of systems that have application to both the perimeter type system as well as those having conventional register locations. The duct work and fittings used in these tests were constructed of aluminum.

Test Equipment

The test equipment was designed and constructed so that wide ranges of air volumes and static pressures were available. A single inlet 24-in. blower was used. The blower was driven through a variable speed drive which obtained very close control of blower speed. Spun aluminum bell-mouthed orifices of nominal diameters 1, 1¼, 1⅝, 2, 2-11/16 and 3½ in. were designed and installed in an orifice plate. A set of six small diameter impact tubes were constructed and installed with the orifices in such a manner that one or any combination could be used at any one time.[1] Orifices not in use were sealed to prevent air leakage. The arrangement obtained accurate measurement of air flow rates from 25 cfm to several hundred cubic feet per minute.

A cap, simulating a furnace plenum, was constructed and attached to the orifice chamber. Starting collars were installed in the cap for 4-in. and 4½-in. round ducts. These outlets were fitted with caps, allowing the selection of either outlet for tests purposes. A piezometer ring was installed on the plenum to provide means for accurate determination of static pressures.[2] All joints and seams downstream of the orifices were sealed air tight by the use of calking compound, sponge rubber gasketing, and adhesive tape. Each system was smoke tested for air tightness before tests were started. Velocity and static pressures in the entire system were obtained by means of inclined draft gages.

System Capacity Tests

Capacity tests were made on systems of 4-in. and 4½-in. round pipe. In each test installation, the starting collar of the same diameter as the duct work being tested was used and the other was sealed. Each system tested consisted of a starting collar, two elbows, a run of straight pipe, a boot, a register box, and a register. Short sections of straight pipe equipped with piezometer rings were installed in the system as shown in Fig. 1. During the testing of each individual size of duct work, three different types of boots including the side boot, the end boot, and the straight boot with elbow, were installed in combination with the register box.

The register used in the capacity tests was of special design, having a solid adjustable front plate, which caused a peripheral discharge of the air. The 4½-in. diameter duct was

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For presentation at the 59th Annual Meeting of THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, Chicago, January 1953.

[1]Exponent numerals refer to References.

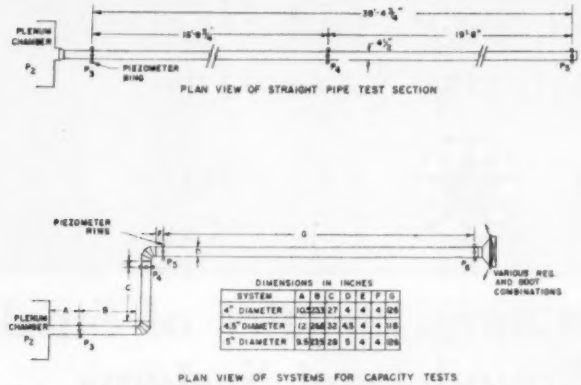

PLENUM CHAMBER
PIEZOMETER RING
PLAN VIEW OF STRAIGHT PIPE TEST SECTION
PIEZOMETER RING
VARIOUS REG. AND BOOT COMBINATIONS
DIMENSIONS IN INCHES
SYSTEM A B C D E F G
4" DIAMETER 10 33 27 4 4 4 26
4.5" DIAMETER 12 36 32 4.5 4 4 28
5" DIAMETER 9.5 35 28 5 4 4 26
PLENUM CHAMBER
PLAN VIEW OF SYSTEMS FOR CAPACITY TESTS

Fig. 1 — Dimensions of piping and location of pressure measuring stations

of special design, fabricated by using collar-type connectors. The register and duct connectors are shown in Fig. 2.

The air metering apparatus as previously described under Test Equipment was used to determine the air flow rates in these tests. By taking static pressure readings at the piezometer stations shown in Fig. 1, it was possible to determine the following pressure losses:

1. Pressure drop across the starting collar.
2. Pressure drop across an elbow including the losses in adjacent pipe caused by turbulent effects of the elbow.
3. Pressure drop across the boot, register box and register.

Data were taken with air deliveries of approximately 50, 75, 100, 125, and 150 cfm. For each run, in addition to the pressure determinations mentioned, readings were taken of dry-bulb temperature, wet-bulb temperature, barometric pressure, plenum static pressure, and orifice velocity pressure.

All capacity tests were run with the register open ½ in., resulting in a free register opening of approximately 16 sq in.

Since the 4½-in. system was neither of standard diameter nor construction, pressure losses in the straight pipe were not available. Therefore, it was necessary to conduct a friction loss test on a straight pipe section. A 40-ft straight section of this duct work, consisting of 2-ft lengths with collar-type joints, was erected and tested. Piezometer rings for determining static pressure drop were installed as shown in Fig. 1. Pressure losses were measured at flow rates from approximately 50 to 280 cfm.

All flow rates were calculated in terms of standard air volumes which would produce the same pressure losses as the flow rates encountered during the actual testing. This procedure results in a common basis for comparison with other performance results reported on a standard air basis. The test information for the 4½ in. round straight duct was calculated on a standard basis and shown in Fig. 3.

Nomenclature

A = area, square feet.
C_p = specific heat of air at constant pressure, Btu per (pound) (Fahrenheit degree).
F_{ei} = pressure loss in fitting, equivalent length of straight duct, feet.
K = orifice coefficient, dimensionless.
L = distance between piezometer stations, feet.
M = cubic feet per minute multiplier for scale, to convert flow rate at any temperature to equivalent at 135 F, dimensionless.
M_2 = *cubic feet per minute* scale multiplier to convert flow rate at 170 F to equivalent at 135 F, dimensionless.
N = *Btu per hour* multiplier to convert heat delivery at any temperature to equivalent at 135 F, dimensionless.
N_2 = *Btu per hour* multiplier to convert heat delivery at 170 F to equivalent at 135 F, dimensionless.
P_3 = pressure at piezometer station 3, inches water.
P_4 = pressure at piezometer station 4, inches water.
P_v = velocity pressure, inches water.
ΔP = pressure drop, inches water per 100 feet of duct.
ΔP_f = pressure loss across fitting, inches water.
Q = heat delivered, Btu per hour.
R = ratio between the volume of standard air and 135 F air for the same pressure drop, dimensionless.
Δt = temperature differential between supply and return air, Fahrenheit degrees.
Δt_2 = temperature differential between 135 F supply air and 65 F return air, Fahrenheit degrees.
Δt_3 = temperature differential between 170 F supply and 65 F return air, Fahrenheit degrees.
V = flow rate, cubic feet per minute.
V_1 = flow rate at standard conditions, cubic feet per minute.
V_2 = flow rate at 135 F and 25 grains moisture per pound dry air, cubic feet per minute.
V_3 = flow rate at 170 F and 25 grains moisture per pound dry air, cubic feet per minute.
v = velocity, feet per second.
v_1 = velocity of standard air, feet per second.
v_2 = velocity of 135 F air, feet per second.
ρ = density of air, pounds per cubic foot.
ρ_1 = density of air at standard conditions, 0.075 pounds per cubic foot.
ρ_2 = density of air at 135 F with 25 grains moisture per pound of dry air, pounds per cubic foot.

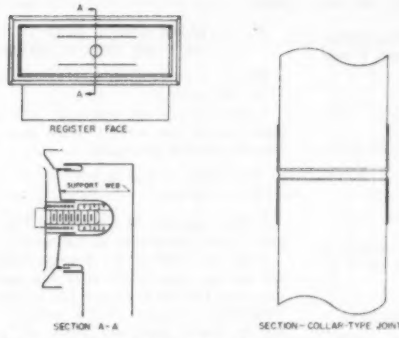


Fig. 2 — Designs of register and collar-type joint

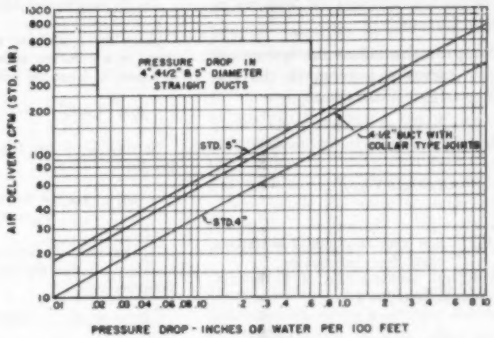

AIR DELIVERY, CFM (STD. AIR)
PRESSURE DROP IN 4", 4½" & 5" DIAMETER STRAIGHT DUCTS
STD. 5"
4½" DUCT WITH COLLAR TYPE JOINTS
STD. 4"
PRESSURE DROP - INCHES OF WATER PER 100 FEET

Fig. 3 — Pressure loss *vs.* air delivery in straight ducts

Sample Calculations for Straight Pipe for Fig. 3

The air flow rate was calculated by the equation,

$$V = 1096.5\,AK\sqrt{P_v/\rho} \quad \cdots\cdots (1)$$

where

V = flow rate, cubic feet per minute.
A = area of duct or fitting, square feet.
K = orifice coefficient, dimensionless.
P_v = velocity pressure, inches water.
ρ = density of air, pounds per cubic foot.

For typical test data, the calculation by Equation 1 is,

$$V = (1096.5)(0.0664)(0.99)\sqrt{\frac{0.50}{0.075}}$$
$$= 186 \text{ cfm}$$

The pressure drop per 100 ft was calculated by the equation,

$$\Delta P = \frac{P_3 - P_4}{L}\,100 \quad \cdots\cdots (2)$$

where

ΔP = pressure loss, inches water per 100 feet of duct.
P_3 = pressure at piezometer station 3, inches water.
P_4 = pressure at piezometer station 4, inches water.
L = distance between piezometer stations, feet.

For typical test data, the calculation by Equation 2 is,

ΔP = [(0.348 − 0.168)/19.8] 100 = 0.91 in. per 100 ft at a rate of 186 cfm

For purposes of comparison, the pressure loss lines of standard 4 and 5-in. round galvanized iron ducts have been superimposed on Fig. 3. It is interesting to note that the pressure loss line for the 4½-in. aluminum duct with collar-type joints, falls fairly close to the 5-in. pressure loss line. Its proximity to the 5-in. line is probably caused mainly by the different type of joints used in this duct work, and the fact that it is made of aluminum rather than galvanized iron.

Fitting Pressure Loss Determinations

The pressure losses in fittings were measured across piezometer stations as shown in Fig. 1, several diameters upstream and downstream from the fitting being tested. The losses were then corrected for the frictional effects of the straight pipe. This procedure facilitates determination of all the losses attributable to the fittings.

Sample calculations for a 4½-in. side boot, register box, and register are made by the equation,

$$F_{ei} = \frac{\Delta P_f}{\Delta P}\,100 \quad \cdots\cdots (3)$$

where

F_{ei} = pressure loss in fitting, equivalent length of straight duct, feet.
ΔP_f = pressure loss across fitting, inches water.

For a typical case by substitution in Equation 3,

$F_{ei} = (0.104/0.40)\ 100 = 26$ ft

For each fitting tested, several determinations were averaged and, when used in Fig. 4 and Fig. 5, the averages were rounded off to the next higher whole number.

Determination of System Capacity Charts

For the purpose of presenting a complete simplified presentation of system capacities under varying conditions of available supply bonnet temperature and pressure, a series of four graphs were calculated and drawn to supplement the fitting equivalent length tables.

Figs. 6 and 7 show the relationship between bonnet pressure, total equivalent length of duct, Btu per hour, and rate of air flow. In presenting these curves, a register temperature of 135 F and a moisture content of 25 grains per pound of dry air were selected as the basis for calculations. By knowing or selecting any two of the variables such as equivalent length, Btu per hour, cubic feet per minute, or bonnet pressure, the remaining variables can be determined.

In order to use Figs. 6 and 7 for register temperatures other than 135 F, corrections may be made by the graphs of Figs. 8 and 9. These graphs present multipliers which can be applied to the Btu per hour and cubic feet per minute scales of Figs. 6 and 7 for varying register temperatures.

Sample Calculations for System Capacity Curves

Sample calculations for system capacity curves are given in the following eight illustrations:

1. Calculation of volume of flow using standard air is made by the formula

$$V_1 = AK1095.5\sqrt{P_v/\rho} \quad \text{(4)}$$

where

V_1 = flow rate at standard conditions, cubic feet per minute.

A typical determination of V_1 by substitution in Equation 4 is

$$V_1 = (0.0386)(0.99)(1096.5)\sqrt{\frac{0.895}{0.75}}$$
$$= 144.2 \text{ cfm}$$

2. Calculation of volume of 135 F air which will produce the same pressure drop as standard air is made by Equation 5. From the Darcy equation it can be observed that pressure loss is proportional to ρv^2. Therefore, for constant pressure drop,

$$\rho_1 v_1^2 = \rho_2 v_2^2 \quad \text{(5)}$$

where

ρ_1 = density of air at standard conditions, 0.075 lb per cubic foot.

ρ_2 = density of air at 135 F with 25 grains moisture per pound of dry air, pounds per cubic foot.

v_1 = velocity of standard air, feet per second.

v_2 = velocity of 135 F air, feet per second.

Since for a uniform duct cross section there is a constant ratio between V and v, Equation 5 can be written:

$$\rho_1 V_1^2 = \rho_2 V_2^2 \quad \text{(6)}$$

Solving for V_2 at 135 F and 25 grains per lb:

$$0.075\ (144.2)^2 = 0.0662 \times V_2^2$$
$$V = 153.6 \text{ cfm}$$

3. The ratio R between the volume of standard air and the volume of 135 F air then becomes

$$R = V_1/V_2 = 144.2/153.6 = 0.94$$

This ratio will be constant for all flow rates.

4. To supply 10,000 Btu per hr to a space using a 135 F register temperature (65 F return temperature) the air volume V_2 required would be found by substitution in Equation 7,

$$V_2 = \frac{Q}{\rho C_p \Delta t 60} \quad \text{(7)}$$

where

V_2 = flow rate at 135 F and 25 grains moisture per pound of dry air, cubic feet per minute.

Q = heat delivered, Btu per hour.

C_p = specific heat of air at constant pressure, Btu per (pound) (Fahrenheit degree).

Δt = temperature differential between supply and return air, Fahrenheit degrees.

then

$$V_2 = [10{,}000/(0.0662)\ (0.24)\ (135 - 65)\ (60)] = 150 \text{ cfm}$$

This is a constant ratio of 15 cfm per (1000 Btu per hr).

5. The volume of standard air that would create the same pressure drop as 150 cfm of 135 F air equals

$$V_1 = RV_2 = 0.94 \times 150$$
$$V_1 = 141 \text{ cfm}$$

6. The capacity chart curves of Figs. 6 and 7 were determined as follows:

From the ASHVE Air Friction Chart,[3] the pressure drop in 100 ft of 4-in. round duct with 141 cfm flowing is 1.25 in. water. Therefore, a supply plenum pressure of 0.2 in. water gage will force 141 cfm standard air or 150 cfm of 135 F air through a length of

$$(0.2/1.25)100 = 16 \text{ ft of duct}$$

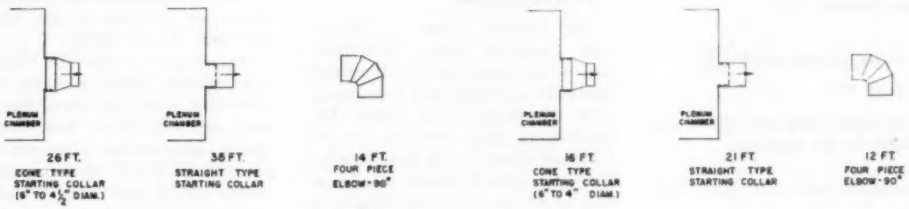
This calculation establishes the point (in Fig. 7) on the 0.2 in. water line where the 16 equivalent ft line and the 10,000 Btu per hr line intersect. All other points required to draw the curves on Figs. 6 and 7 were calculated in a similar manner.

7. Calculation of a cfm multiplier for *register temperatures* other than 135 F at constant moisture content is made from Equation 5

$$\rho_1 V_1^2 = \rho_2 V_2^2$$

As an example using a 170 F register temperature, the multiplier becomes

$$\rho_2 V_2^2 = \rho_3 V_3^2$$
$$0.0662\ V_2^2 = 0.0627\ V_3^2$$
$$V_2/V_3 = M_3 = 1.029$$



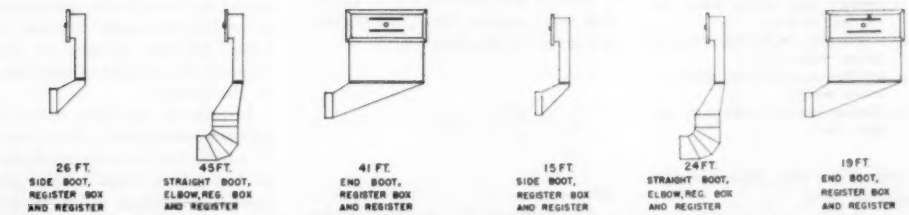

26 FT.
SIDE BOOT, REGISTER BOX AND REGISTER
45 FT.
STRAIGHT BOOT, ELBOW, REG. BOX AND REGISTER
41 FT.
END BOOT, REGISTER BOX AND REGISTER
15 FT.
SIDE BOOT, REGISTER BOX AND REGISTER
24 FT.
STRAIGHT BOOT, ELBOW, REG. BOX AND REGISTER
19 FT.
END BOOT, REGISTER BOX AND REGISTER

Fig. 4 — Equivalent length of fittings in 4½-in. system

Notes: Add length of any 12 x 2 in. wall stack to the measured length of 4½-in. duct. All equivalent lengths given for registers are based on ½-in. opening.

Fig. 5 — Equivalent length of fittings in 4-in. system

Notes: Add 40 percent of the length of any 12 x 2 in. stack to the measured length of 4-in. duct. All equivalent lengths given for registers are based on ½-in. opening.

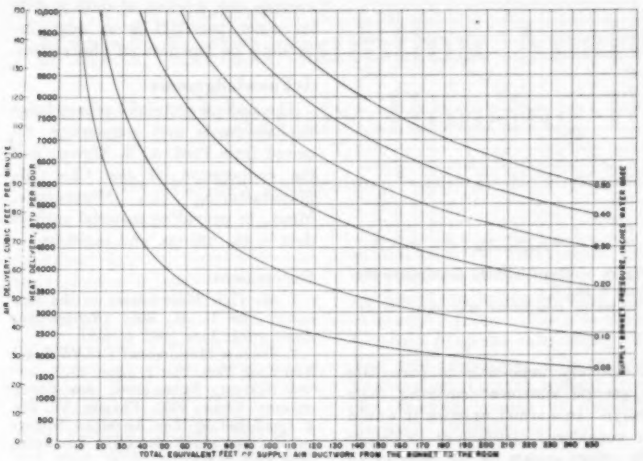


Fig. 6 — Capacities of 4½-in. round duct systems at various bonnet pressures

Notes: For bonnet pressures from 0.05 to 0.50 in. water. Based on 135 F register temperature, barometric pressure, 29.92 in. Hg and 25 grains moisture per pound of dry air.

where

V_2 = flow rate at 170 F and 25 grains moisture per pound dry air, cubic feet per minute.

M_2 = *cubic feet per minute* scale multiplier to convert flow rate at 170 F to equivalent at 135 F, dimensionless.

Therefore, the cfm flowing at 170 F register temperature will be 1.029 (volume at a 135 F register temperature).

8. Calculation of a *Btu per hour* multiplier for register temperature other than 135 F at constant moisture content is made as follows:

The amount of heat delivered at any register temperature is proportional to $\rho V C_p \Delta t$.

The ratio N between the heat delivery at a temperature other than 135 F to that at 135 F becomes

$$N = [(\rho V C_p \Delta t)/(\rho V_2 C_p \Delta t_2)]$$

where

N = *Btu per hour* multiplier to convert heat delivery at any temperature to equivalent at 135 F, dimensionless.

Δt_2 = temperature differential between 135 F supply air and 65 F return air, Fahrenheit.

At a 170 F register temperature:

$$N_3 = [(\rho_3 V_3 C_p \Delta t_3)/(\rho_2 V_2 C_p \Delta t_2)]$$

where

N_3 = *Btu per hour* multiplier to convert heat delivery at 170 F to equivalent at 135 F, dimensionless.

Δt_3 = temperature differential between 170 F supply air and 65 F return air, Fahrenheit degrees.

N_3 = [(0.0627) (158) (0.24) (170 − 65)]/[(0.0662) (153.6) (0.24) (135 − 65)]

N_3 = 1.46

Discussion of Results

It is apparent from the preceding graphs that small diameter round duct systems can be designed to handle quantities of air comparable to those used in the design of conventional residential heating systems. It should be noted, however, that to achieve this result, supply bonnet pressures of a greater magnitude than those normally encountered in conventional systems are required.

The small diameter systems may be made compatible with conventional residential air circulating equipment by limiting the air delivery through any one register and consequently using a greater number of registers to supply the same amount of heat. This result is also attainable through the use of elevated register temperatures. The authors prefer the former rather than the latter solution because (*a*) it provides a desirable safety factor in the design, and (*b*) it makes satisfactory air diffusion more readily attainable.

An obvious and workable solution to the small duct capacity problem is the substitution of blowers with greater static pressure ratings. A caution is suggested in this regard because the maximum satisfactory bonnet pressure may be limited by the resulting velocities and the corresponding noise level.

It can be observed that in many cases the fittings used in the small

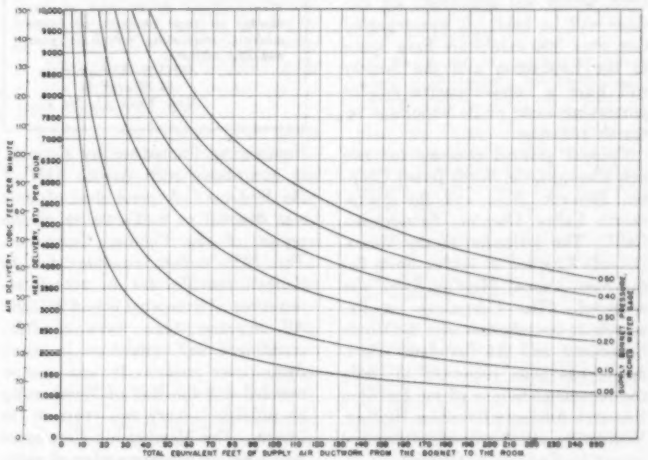


Fig. 7 — Capacities of 4-in. round duct systems at various bonnet pressures

Notes: For bonnet pressures from 0.05 to 0.50 in. water. Based on 135 F register temperature, barometric pressure 29.92 in. Hg and 25 grains moisture per pound of dry air.

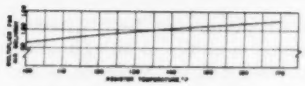


Fig. 8 — Air delivery multipliers for Figs. 6 and 7
(for register temperatures other than 135 F)

duct systems constitute the major part of the total equivalent length. It is therefore considered desirable that fitting design should minimize dynamic energy losses.

This paper considers primarily the design of the supply side of the air distribution system with the supply bonnet pressure being used as the reference pressure on all graphs. The return duct systems should be designed to keep pressure loss to a minimum. The fact that return systems vary greatly in design makes

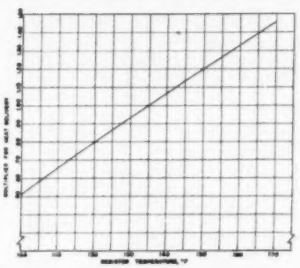


Fig. 9 — Heat delivery multipliers for Figs. 6 and 7
(for register temperatures other than 135 F)

it virtually impossible to formulate a general statement covering their design. In normal practice it would be considered satisfactory to design the return system on the basis of an average unit friction of 0.04 to 0.08 in. water per 100 ft of duct, depending on the size of the system.

Acknowledgments

The authors gratefully acknowledge the assistance and suggestions received from Prof. A. B. Algren; and the cooperation of the Char-Gale Manufacturing Co., Minneapolis, Minn., in providing material such as duct work, fittings, and registers.

References

1. Air Flow Measurement in the Laboratory, by D. D. Wile (*Refrigerating Engineering*, June 1947, p. 515).

2. Pressure Measurement (*ASME Power Test Code* 1936, Part 2, Chap. 2).

3. Heating, Ventilating, Air Conditioning Guide 1952, Chapter 31, Fig. 1 (published by The American Society of Heating and Ventilating Engineers, New York, N.Y.).

COUNCIL HOLDS FALL MEETING IN NEW YORK

A meeting of Council was held at the Hotel Statler, New York, N.Y., October 11, with all Officers and members present. The Program and Papers Committee presented the technical program for the 59th Annual Meeting in Chicago, January 26-29, 1953, which was approved; six sessions will be held. It was reported that over 300 exhibitors have space in the Exposition and the Society will have a comprehensive exhibit portraying some of its important research activities.

Council granted charters for two new Chapters, the North Jersey Chapter, Newark, N.J., and the Sacramento Valley Chapter, Sacramento, Calif. The invitation of the Massachusetts Chapter to act as hosts for the Semi-Annual Meeting 1954 was accepted. The Committee on Research, in consultation with the Guide Committee and the Standards Commitee, has been requested to study the recommendations of the Building Research Advisory Board on Heating, Ventilating and Air Conditioning and report its findings to Council.

Four members and an alternate member were selected to serve on the Nominating Committee by Council, in accordance with Article VIII of the By-Laws. A great deal of time was devoted to a discussion of the report of the Finance Committee. The 1953 budget recommended to Council provides for an overall expenditure of somewhat over $460,000. All expense items were carefully scrutinized and reductions in many items were made. It was recommended that the Roll of Membership be published every two years in the future. The Membership Committee was asked to prepare a plan of membership expansion for Council consideration.

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SOCIETY OFFICERS VISIT CHAPTERS

November will be a busy month for Pres. Ernest Szekely, Milwaukee, Wis., who is scheduled to address four Society Chapters, at Memphis, November 17, New Orleans, November 18, Shreveport, November 20, and Houston, November 21.

Second Vice Pres. L. N. Hunter, Johnstown, Pa., will visit the Pittsburgh Chapter, November 17, and the Baltimore Chapter, November 19.

ASTM APPOINTS NEW EXECUTIVE SECRETARY

The *American Society of Testing Materials* recently announced the election of R. J. Painter as executive secretary and R. E. Hess as associate executive secretary and editor-in-chief.

Mr. Painter joined the *ASTM* staff in 1931, and served most recently as treasurer and assistant secretary of that Society. He succeeds C. L. Warwick, long-time executive secretary who died suddenly last April. Mr. Hess has been a member of the *ASTM* staff since 1920 and prior to his new appointment was assistant executive secretary and editor.

Fuel Consumption Analysis for Multi-Family Housing Projects

By Rutcher Skagerberg* and J. E. Phifer**, Washington, D. C.

SUMMARY — This paper presents a fuel consumption analysis based on space heating data collected from 152 low-rent housing projects containing 76,852 dwelling units. The records covered an 11-year period from the heating season of 1938-39 through 1948-49.

AS PUBLIC housing projects became more numerous means were developed to evaluate statistically the management operations. For heating operations it was apparent that the quantities of fuel used might best serve that purpose. The data were collected only where management supplied the fuel because it was only from such projects that fuel consumption data could be obtained.

Now that 11 years have elapsed it seems timely to analyze the data to see if there are any indications or trends that might be significant and useful to planners, designers and operators. That is the purpose of this paper.

Techniques and Definitions

After collecting the fuel consumption data the tons of coal, gallons of oil and cubic feet of gas were converted to equivalent heat input in Btu.

The unit Btu per room per year was selected as a useful and easily obtained unit for comparison purpose. Cubic foot volume and the square feet of floor area were considered in place of the room basis but were dropped because it was more practicable for the purposes in view to use the room as a basis since the rooms were reasonably standard and the room count could readily be obtained and agreed upon.

Space heating fuel could not be compared on a Btu-per-room basis without considering the climate and consequently the unit was changed to Btu-per-room-per-degree-day. It seemed, however, that fuel usage might not be proportional to degree-days in different climates and therefore, the country was divided into six zones having degree-days as follows:

Zone	Degree-Days
I	Less than 1500
II	1500 to 3499
III	3500 to 4499
IV	4500 to 5499
V	5500 to 6499
VI	6500 and over

Zone I is not involved in these analyses as no space heating is used in it. Since few project-operated heating plants are used in the warmest climates, Zone II involves a range of 2000 degree-days whereas each of the other zones covers only a 1000 degree-day range.

While in the coldest zones space heating constitutes the largest portion of the heating plant load, the fuel used for domestic hot water, underground line losses and boiler losses is a considerable amount. For these latter usages which were not considered to be variable with weather the degree-day unit did not apply. Therefore, it was necessary to separate space fuel requirements from these other items and, consequently, three fuel quantities were considered:

1. *Total fuel*, consisting of the entire annual fuel consumption expressed in Btu-per-room-per-year.
2. *Space fuel*, consisting of the fuel used for space heating and expressed in two units: *Btu-per-room-per-year* and *Btu-per-room-per-degree-day*.
3. *Other fuel*, consisting of fuel consumed for domestic hot water, laundry purposes, underground pipe line losses, and boiler house losses.

Since the projects report only the total quantities of fuel used each month it was necessary to find a simple and practical method of determining the *space fuel* and *other fuel* amounts. This was done by taking the *total fuel* for the months of July and August as representing *other fuel* since no *space fuel* was used then. Assuming that *other fuel* was the same for each month, the combined July and August quantities multiplied by six provided the annual value for *other fuel* which was subtracted from the annual *total fuel* to obtain a value for annual *space fuel*.

Three questions arose as to the accuracy of the assumption relative to the uniformity of the *other fuel* usage throughout the year:

1. There was the question of different quantities of domestic hot water used in different seasons. This was checked over a two-year period by metering the hot water for 10,000 families. There was noted no appreciable differences between seasons although there was a difference between projects and between families within projects ranging from 33 to 78 gal per day and averaging 56.
2. The effect of colder incoming water in winter than in summer seemed to require some adjustment. At the same time the improved efficiency of boilers during heavy-load periods *vs.* light summer load condition was considered important. Investigations revealed that one of these factors almost offsets the other. In fact the difference was so slight when comparing final results that it was not worth the great mass of computations required. Therefore, no corrections are made for these two factors.
3. Underground line losses were also investigated. While the tests performed

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**Assistant to Director, Operations Engineering Branch, Housing and Home Finance Agency.

For presentation at the 59th Annual Meeting of THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, Chicago, January 1953.

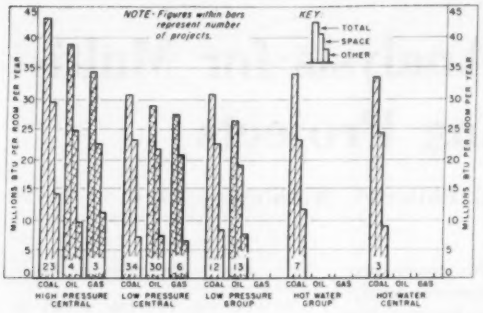

Fig. 1—Effects of plant and fuel types on total, space and other fuels

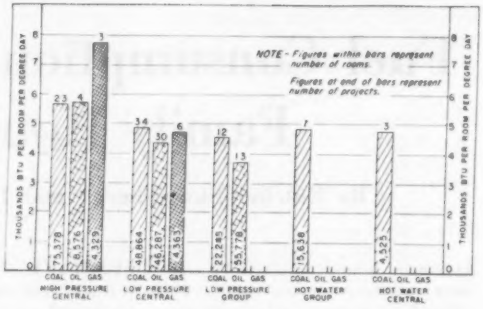
NOTE - Figures within bars represent number of rooms.
Figures at end of bars represent number of projects.
THOUSANDS BTU PER ROOM PER DEGREE DAY
COAL OIL GAS
HIGH PRESSURE CENTRAL
LOW PRESSURE CENTRAL
LOW PRESSURE GROUP
HOT WATER GROUP
HOT WATER CENTRAL

Fig. 2—Effects of plant and fuel types on space fuel

were not conclusive it was decided that the thermal lag of the earth had a tendency to even out this matter. As an example the straw-hatted workmen in Saskatchewan in Canada are reported to thaw out underground water lines in June. Also in Washington, D. C. the maximum underground temperature is achieved in October and the minimum in April. In other words it is conceivable that underground losses may be higher in July than in November or December.

In view of considerations 1 to 3 it is believed that the practical method employed in computing space heat fuel requirements is sufficiently precise for the purposes of evaluating performances and for providing data for the analyses in this paper.

Results

Ten figures are presented, each of which was prepared to show the effect on fuel consumption of one or more factors having influence and being subject to change by the planner, designer, or manager. The comments and observations applying to each chart represent the authors' interpretation of data obtained in the field.

The term, *Btu-per-room-per-degree-day*, is referred to as the *Fuel Burning Rate* or simply the *Fuel Rate* as a simplification. *Space fuel* is used to denote quantity of fuel for space heating.

Effects of Plant and Fuel Types on Total, Space and Other Fuels

Fig. 1 is based on data for 135 projects, covers all zones, and represents a cross section of the entire country. Comparisons are based upon the Btu-per-room-per-year.

Observations

1. Low pressure central or group plants are more economical than high pressure central plants when burning coal.

2. Oil is a more economical fuel than coal in low pressure central or group plants.

3. Group plants with shorter and smaller underground lines do not, as might be expected, show lower quantities of *other fuel* than low pressure central plants. Lower summer boiler efficiency probably is responsible.

Effects of Plant and Fuel Types on Space Fuel (Fig. 2)

Space fuel consumption can best be analyzed on a degree-day basis although, as will be shown later, comparisons between localities with widely different average temperatures will necessitate the use of a correction factor (see Fig. 5). This chart, based upon 135 projects, shows a country-wide comparison of space fuel expressed in Btu-per-room-per-degree-day, and is a more realistic comparison of performance than Fig. 1.

Observations

1. Low pressure plants show a lower fuel consumption than high pressure plants.

2. For low pressure plants, oil shows a preference over coal. Factors which contribute to this difference are the more consistent quality of fuel when using oil, automatic firing, and less reliance on operators.

3. Hot water group plants compare favorably with low pressure central plants using coal.

Space Fuel Studies (Comparison of Heating Control Systems and of Fuels)

The data upon which Fig. 3 is based represent up to 11 years of operation of 92 projects in the three coldest Zones, IV, V and VI.

Each bar represents a project and is classified as to type of fuel — coal, oil, or purchased steam, and is arranged on the chart with others of the same fuel. Within each fuel group the projects are again grouped by types of heat control, and the order in which the bars appear corresponds to the number of annual degree-days of the locality, the lowest being at the left.

Two types of heat control systems are used with steam heating in public low-rent housing projects: *on-and-off* and *continuous flow*, more accurately described as *open-and-shut* and *modulating*. A third type is the *hot water temperature* type and is used with hot water systems.

While these control systems have been called *zone controls*, they are not actually zoned as to exposure. Rather, they regulate the flow of steam to entire buildings or groups of buildings with no regard to exposure of the different parts or sides of those buildings. This regulation is obtained through instruments that detect weather changes such as temperature, wind and solar intensity.

Observations

1. Oil shows 11 percent lower consumption than coal: 4153 *vs.* 4676 Btu-per-

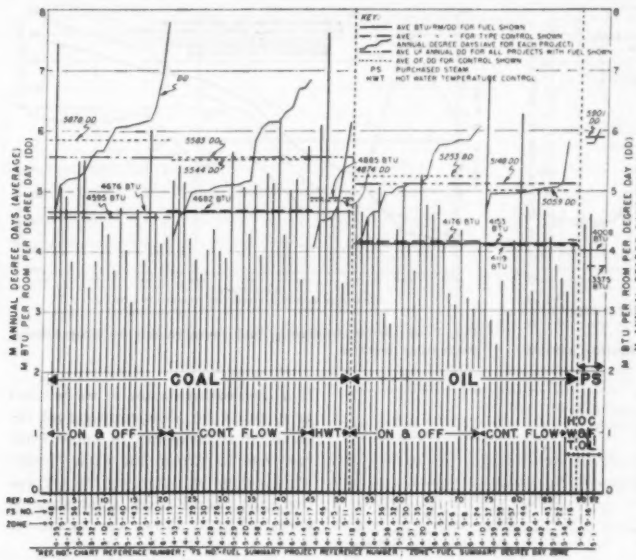

Fig. 3—Space fuel studies (comparison of heating control systems and of fuels)

room-per-degree-day respectively. Purchased steam with unit consumption of 4008 Btu compares favorably with oil.

2. The oil installations are in lower average degree-day localities than coal and purchased steam: 5148 *vs.* 5583 for coal and 5901 degree-days for steam. As will be shown later, the performance (per degree-day) generally improves with lower outdoor temperatures, *i.e.*, greater degree-day values.

3. The differences in average performance of controls of different types appear negligible.

4. A tendency is shown toward higher fuel consumption per degree-day in milder climates. As will be shown later, this is much more pronounced in more southerly zones which are not included in Fig. 3.

5. Performances of different projects vary quite widely, although of the coal plants 37 percent lie within ± 10 percent of the average, and 70 percent within 20 percent. Of the oil plants, the values are 25 percent and 65 percent respectively.

Differences in project performance can be attributed to such factors as: (1) management control of overheating; (2) conditioning of equipment; (3) skill and interest of operators; (4) wind and other weather effects aside from temperatures; (5) policy on such matters as night shutdown; (6) condition and kind of hot water generating equipment; and (7) plumbing. The last items may show high values for *other fuel* and result in exceptionally low values of *space fuel* or vice versa.

Effects of Heat Control Operation

Fig. 4 is based upon space heat data for 130 projects. The lower half is expressed in Btu-per-room-per-year; the upper half in Btu-per-room-per-degree-day. The performance of any project may be evaluated by comparing its fuel rate with others in the same degree-day zone and with the average fuel rate of that zone.

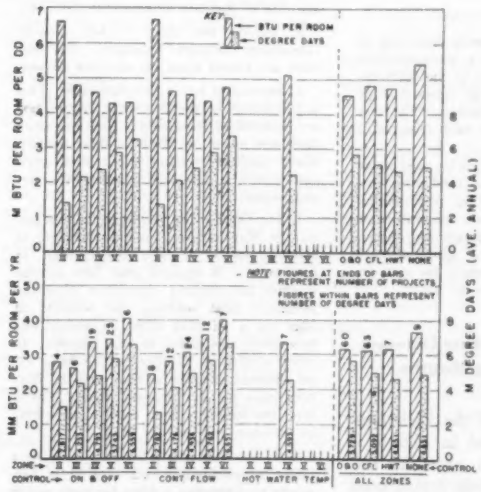

Fig. 4—Effects of heat control operation

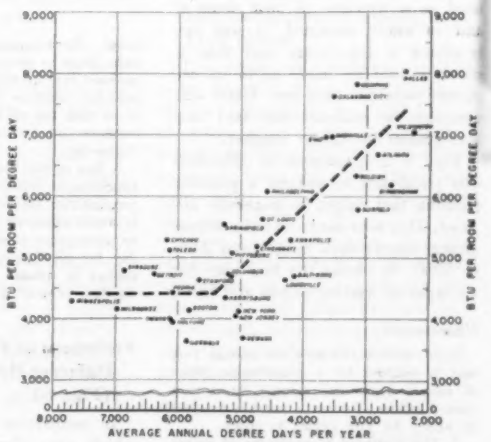

Fig. 5—Effects of climate on fuel rate

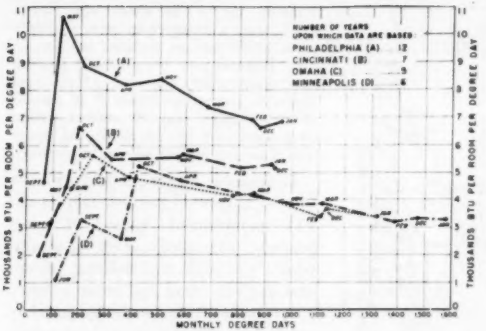
NUMBER OF YEARS UPON WHICH DATA ARE BASED
PHILADELPHIA (A) 12
CINCINNATI (B) 7
OMAHA (C) 5
MINNEAPOLIS (D) 6
THOUSANDS BTU PER ROOM PER DEGREE DAY
MONTHLY DEGREE DAYS

Fig. 6—Variations of fuel rate between different heating months

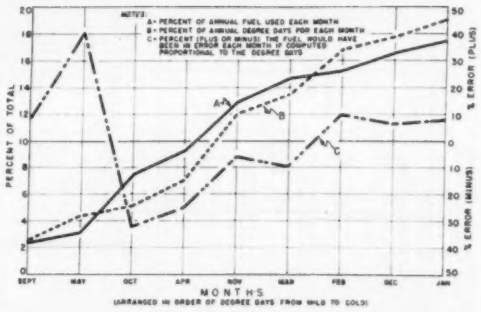
NOTES:
A = PERCENT OF ANNUAL FUEL USED EACH MONTH
B = PERCENT OF ANNUAL DEGREE DAYS FOR EACH MONTH
C = PERCENT (PLUS OR MINUS) THE FUEL WOULD HAVE BEEN IN ERROR EACH MONTH IF COMPUTED PROPORTIONAL TO THE DEGREE DAYS
PERCENT OF TOTAL
% ERROR (PLUS)
% ERROR (MINUS)
MONTHS
(ARRANGED IN ORDER OF DEGREE DAYS FROM MILD TO COLD)

Fig. 7—Error in estimating fuel requirements by proportional degree-day method

Observations

1. The all-zones comparison (right side of Fig. 4) shows the different types of controls to be about equal in performance. The slight advantage of the *on-and-off* type in the fuel rate comparison (upper right) may be accounted for by the fact that they predominate in colder climates.

2. Controlled heating systems show less fuel consumption than uncontrolled systems. The upper chart indicates a saving of 16 percent and the lower, 13 percent.

3. Here again is illustrated the fact that while with increasingly colder temperatures the annual fuel consumption increases, the rate of consumption per degree-day decreases.

Effects of Climate on Fuel Rate

Since the degree-day is generally used as a measure of heat demand and is easily obtained, it was determined a few years ago that a check should be made as to its accuracy as such a measure. There was considerable evidence that fuel rate was greater in milder weather.

Fig. 5 is presented to illustrate this point and to suggest a possible formula that might be generally applied. This represents 35 cities whose annual degree-days range from 2300 to 7800. It shows the fuel rate for all types of heating plants and fuels.

Observations

1. In coldest climates the annual fuel rate is constant for a considerable range of annual degree-day values. In moving toward milder climates a point is reached at which the rate begins to climb.

2. The scattered arrangement of points on the chart may suggest several trend lines either curved or made up of combinations of curved and straight lines. It is apparent that a rather definite pattern exists. By averaging groups from left to right there is developed a horizontal-line constant rate at 4400 Btu to the 5300 degree-day ordinate, than an upward slope of 45 deg for milder weather. The rate increases by 1 Btu for each rise of 1 degree-day.

A line of this kind might be used as an approximate criterion for predicting fuel consumption and evaluating performance. It would obviously be more accurate than an assumption of a fixed rate per degree-day for all localities. A study of each project is needed to obtain its own individual measuring stick or norm.

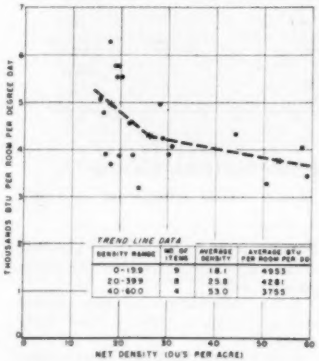
THOUSANDS BTU PER ROOM PER DEGREE DAY
TREND LINE DATA
DENSITY RANGE
NO. OF ITEMS
AVERAGE DENSITY
AVERAGE BTU PER ROOM PER DD
0-199 9 181 4953
200-399 8 258 4281
400-600 4 530 3795
NET DENSITY (DU'S PER ACRE)

Fig. 8—Influence of density of fuel consumption

Variations of Fuel Rate Between Different Heating Months (Fig. 6)

In connection with the variations which were illustrated in Fig. 5, it is also important to note the differences in consumption during mild and cold weather in any one locality.

If a degree-day factor is to be used as a guide for determining fuel demand, it is necessary to know what fuel rate to expect for each month. This is done by obtaining the average for each month over a number of years. Fig. 6 shows the variations in fuel rate for four localities — Philadelphia, Cincinnati, Omaha and Minneapolis, where project daily fuel consumptions were accurately measured and recorded.

Observations

1. There is striking similarity of fuel rates for the four projects.

2. From October through January, the rate decreases about 1500 Btu in Cincinnati and 2400 Btu in Omaha, the average rate of decrease being about 2000 Btu.

3. During the three coldest months (December through February) the fuel rates are almost equal for any one project.

4. September has a low fuel rate. This is attributed to the fact that degree-days are established from cold nights and since days are warm no fuel is then needed. Many projects practice night shut down and obtain a low fuel consumption per degree-day.

5. For Omaha and Minneapolis, the fuel rate in May is lower than in October; in Minneapolis it is also lower than in September. It appears that late autumn weather has chilling experience after the summer's heat whereas the weather in May has a warming effect on people who have been acclimated to cold winters. In other words, in October people have not yet donned heavier clothes and in May they have not yet removed them. Therefore, the tendency is to require more heat in October and less in May.

6. If the degree-day is to be used as a factor in evaluating fuel rate, it is necessary to determine a norm for each month or for some other short period. The

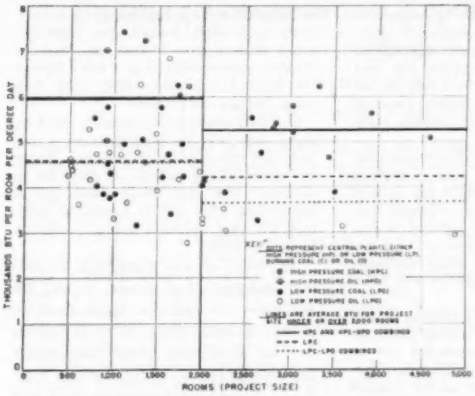

Fig. 9—Effects of project size on fuel consumption

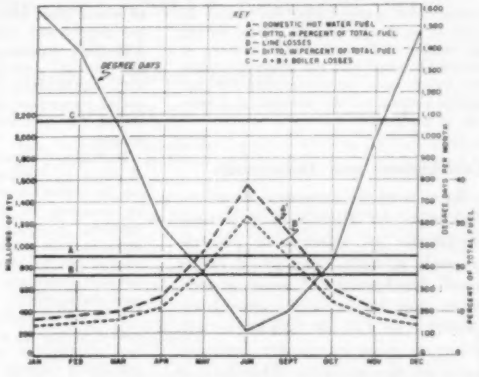

Fig. 10—Comparisons of fuel consumptions for domestic hot water and underground steam line losses

annual rate cannot be applied to monthly or weekly periods.

7. For accurate budgeting it is necessary to develop a separate criterion for each project.

Error in Estimating Fuel Requirements by Proportional Degree-Day Method

Fig. 7 shows a percentage presentation of the monthly fuel consumption for the Minneapolis project shown in Fig. 6. The error in estimating fuel consumption by assuming the rate to be proportional to the degree-days, as previously discussed, is also illustrated by line C referred to the (% error) scale on the right.

Observations

1. The important presentation is shown by line C. It is obvious that monthly consumption is not proportional to the number of degree-days therein, for when that method of estimating is employed, differences from actual consumption range from 40 percent *over* for May to 32 percent *under* for October. However, the errors of overestimating in December, January and February are offset by errors of underestimating in March and November so the annual fuel estimate may not be greatly affected by these monthly differences.

2. The relationship between lines A and B (percent of annual fuel and percent of annual degree-days) illustrates again the fact that the fuel rate is less during cold than during mild weather.

Influence of Density on Fuel Consumption

The density of a project is defined as the number of dwelling units per acre of land under management control, omitting vacant and unused land and large play fields. Fig. 8 shows the fuel rates of 21 coal-burning low-pressure plants.

Observations

1. While the points are quite scattered, there is a definite trend toward more economical heating in greater density projects. Other factors, such as project size and geographical locations, exert some influence here. It is necessary, therefore, to analyze each situation with its own conditions in mind.

Effects of Project Size on Fuel Consumption

Fig. 9 gives consumption data for 69 projects and shows in a general way the approximate influence of project size. Only central plants were included in this study to avoid the influence of plant type. Coal and oil as well as high and low pressure systems are identified by different symbols. Two categories of size were chosen, *i.e.*, below and above 2,000 rooms. In view of the number of plants involved of each type and the scattered arrangement of points, the relative fuel rates are shown by straight lines as the most practical criterion. This chart is an endeavor to provide a rough guide for the selection of systems.

Observations

1. The average of all large-project (2,000-5,000 rooms) fuel rates is 12 percent lower than that of the small projects.

2. The average of fuel rates for all large projects with high pressure plants burning coal or oil is about 12 percent under the similar average for small projects.

3. The average of fuel rates for all large projects with low pressure plants burning coal is about 9 percent under the similar average for small projects.

4. The average of fuel rates for all large projects with low pressure plants burning coal or oil combined is about 20 percent under the similar average for small projects.

Comparison of Fuel Consumption for Domestic Hot Water and Underground Steam Line Losses

This study was made to provide some idea of the relative amounts of fuel chargeable to line losses, domestic water heating and boiler losses (see Fig. 10). The assumption was made that these items remain relatively constant throughout the year.

Since space fuel varies approximately directly with degree-days, the percentage of fuel represented by other items will naturally vary inversely with degree-days. The basic data were obtained from a project at Minneapolis.

Observations

1. Fig. 10 is fairly self-explanatory. It should be observed, however, that the amount of fuel lost through transmission lines closely approximates that used for providing hot water. Line losses vary from 7½ percent below that used for

domestic hot water during the month of June to only 1½ percent below during the months of December and January. It should be noted that the above comments are based upon operating data for one typical project, not the averages of a number of projects.

Conclusions and Indications

In view of the numerous situations that make for differences in heating operations the number of projects in each possible category is rather small. Furthermore 11 years of operation does not constitute enough experience to furnish conclusive evidence or good norms for some aspects of the analysis. Therefore, it is somewhat premature to draw conclusions from some of these data. However, there are a number of indications that may at a later date be resolved into definite conclusions. Other indications are sufficiently pronounced at this time so that they may be regarded as conclusive.

The following *conclusions* are offered:

1. Low pressure steam plants are less wasteful of fuel than high pressure plants.
2. Underground pipeline losses constitute a relatively large part of the heating load of a central system and deserve consideration particularly from the viewpoint of central plant adaptability to projects of low density with long underground runs.
3. High density projects, compared to low density projects, consume less fuel with central plants and where they do not adapt themselves to individual heating should be considered for central plant heating.
4. Automatic control of the distribution of steam to dwellings in housing projects can be counted upon to effect fuel savings as compared to operation without such controls. A saving of 15 percent is conservative with average operation. Greater returns can be expected where operators are fully instructed, cooperative and under good management.
5. In any multiple-family housing project with a central or group heating plant the fuel consumption per degree-day can be considered constant during December, January and February. For milder weather that value must be increased. Similarly the value is different in different localities particularly when the annual fuel consumption is compared for northern and southern locations.

The following *indications* are apparent:

1. Oil lends itself to lower fuel usage than coal. This is influenced by the ease with which firing control is accomplished, the more uniform quality of fuel, and the reduction of reliance on the human factors.
2. Hot water central or group heating plants compare favorably in fuel economy with low pressure steam plants.
3. The difference, on the average, in performance of different types of heat control systems appears negligible. A simple, easily understood, rugged, less expensive means of automatic control may be more effective economically than a more perfect but more complicated system that may easily become inoperative.
4. A fuel consumption formula based on degree-days may be predicated on a uniform fuel rate (Btu-per-degree-day) during the three coldest months or annually in localities with more than 5,000 annual degree-days. For milder months or localities the rate increases and a correction factor is needed.

In view of the numerous factors that influence fuel usage, it will be necessary to make a more detailed study of each plant to find reasons for its departure from what might be considered a *norm* for its type. Such studies are quite involved and beyond the scope of this endeavor. A recently adopted policy for making periodic engineering surveys of properties is bringing forth information that may be of value for this purpose.

A 15-year summary is now planned which should be an improvement over the last summary, both in method of presentation and coverage. It is expected that this summary will be issued during 1954 and that the data contained therein will be more significant in pointing toward important conclusions.

HOUSING CONFERENCE TO DISCUSS HOT, HUMID AND DRY CLIMATES

The Building Research Advisory Board, Washington, D.C., reports an impressive list of speakers for a two-day Conference on Housing and Building in Hot-Humid and Hot-Dry Climates. Among the speakers who will present papers are: Ralph Walker, Voorhees, Walker, Foley & Smith; Dr. D. H. K. Lee, Johns Hopkins University; Aladar Olgyay, Massachusetts Institute of Technology; Prof. Robert Deering, University of California; Prof. J. Neils Thompson, University of Texas; G. M. Rapp, John B. Pierce Foundation; Prof. G. E. Sutton, University of Florida; Victor Olgyay, Massachusetts Institute of Technology; Albert Mayer, Mayer and Whittlesey, New York; R. H. Reed, Texas Engineering Experiment Station; Prof. R. F. Dawson, University of Texas; B. M. Holmes, Australian Commonwealth Division of Building Research; Dean W. R. Woolrich, University of Texas; and T. H. Urdahl, Washington, D.C.

Moderators for the Conference will be M. Allen Pond, U.S. Public Health Service; Ralph Walker, G. M. Rapp, and T. S. Rogers, Owens-Corning Fiberglas Corp.

OREGON CHAPTER COOPERATES WITH OSC STUDENT BRANCH

Oregon Chapter members were asked to bring in any of their extra copies of THE GUIDE (editions within the last few years) to the October meeting, as a result of a request by Prof. A. D. Hughes, who requested these for the members of the Student Branch of Oregon State College, Corvallis, Ore.

The OSC Student Branch held its first meeting of the year on October 1 at the Mechanical Engineering Laboratory at the College. This opening meeting featured talks given by several students describing their engineering jobs which they held during the summer months. One described his experience on a power dam construction project, another student told of the special slide rules used by the Navy for heating and ventilating design at Mare Island, and another described his job on a research project to recover wasted mint oils for mint distillers.

Professor Hughes indicated that the Student Branch membership was expected to exceed last year's total.

Building Conservation Report Stresses ASHVE Research Need

BRAB'S Advisory Panel Cites Society Guide and Suggests More Studies

By I. W. Cotton, *Chairman*, ASHVE Committee on Research

The U. S. Department of Commerce has recently published the results of a Study of Conservation in Building Construction*, made by the Building Research Advisory Board for the Defense Production Administration. Although the initial purpose of the study was the conservation of critical materials in Federal construction, the report also makes recommendations which *emphasize frugal design and elimination of wasteful use of materials, both of which promote economy in cost and make a substantial contribution to operations whether in peace or war.*

To assist in this study, a number of Advisory Panels were set up, all panel members being appointed as individuals and not as representatives of organizations.

On the Advisory Panel on Heating, Ventilating and Air Conditioning, fifteen of the seventeen members were ASHVE members, all of whom were closely associated with Society research.

Not only the personnel of the Panel but the numerous references to both past and present ASHVE research indicate again the great amount of essential information on heating, ventilating and air conditioning that has resulted from our Society's continuing research program.

Recommendations of the Panel on Heating, Ventilating and Air Conditioning

The Panel agreed that conservation could be achieved by adhering to the engineering practices published in the Society's Heating, Ventilating and Air Conditioning GUIDE, with due consideration given to the Panel's recommendations. These recommendations were not to replace adequate design procedures, but to discourage unnecessary excesses, but they emphasized the importance of engineering judgment as a major factor in design.

The Panel recommended, *that professional associations support these recommendations and encourage discussion, development and use of these recommendations throughout the engineering profession.*

Since some of the recommendations could have an important effect on the present and future programs of our Committee on Research, they are briefly outlined here together with notes on current or planned Society research programs. These recommendations may serve as a starting point for discussions of the role which ASHVE Research can play in the construction field for public benefit.

Heat Load Calculations

Design Premise — The Panel recommended steps to *encourage use of the ASHVE method of calculating heat losses, and discourage the use of arbitrary percentage additions, such as exposure and other factors which are in excess of ASHVE design values.*

Outside Design Data — The Panel urged the Society to *review and amplify the existing weather climatic data given in THE GUIDE.*

Infiltration — The report recommends that the crack method be used as the preferred method of calculating infiltration losses . . . with the air change method used as the over-all guide and check on the values obtained by the crack method. The Society was urged to review existing infiltration data.

Heat Holding Capacity — The report urges the Society to devise a practical method for compensating heat load calculations to allow for the heat-holding capacities of heavy *vs.* light building materials.

All the items mentioned are included in the Society's long range research program developed in 1951 by Technical Advisory Committees, reviewed and adopted by the Committee on Research and approved by Council.

The TAC on Heating Loads is presently sponsoring studies on infiltration at the National Bureau of Standards, using special equipment purchased by the Society and loaned to the Bureau. Present plans call for the transfer of this equipment for use in studies in several test houses at the University of Illinois at Urbana in 1953. This TAC has recently considered the question of heating load calculations, the relative significance of the various items included in heating loads and means of improving the accuracy of calculations.

With guidance from the TAC on Insulation the Society is making a thorough review of the heat transmission coefficients of all types of current building and insulating materials and constructions.

Air Conditioning

Design Data — The Society is urged *to review and amplify the summer climatic data given in THE GUIDE.*

Cooling Storage Effect — The Panel recommends *that the Society determine practical calculations for reducing size of air conditioning equipment by taking advantage of pre-cooling storage effect of surrounding building structure and equipment.*

Design

Recognizing that design standards need constant study and re-evaluation the Panel recommends:

That the United States Weather Bureau prepare winter and summer weather data which are especially arranged for use by the building industry.

That studies be made to eliminate as many as possible of those factors which tend to increase heating and cooling loads.

The need for better and more extensive winter and summer weather data for design has long been recognized by many Society members. The reorganized and expanded TAC on Weather Design Conditions supported by the Committee on Research has advocated the preparation of weather data in understandable form readily usable by the heating and air conditioning and building industries.

Special attention has recently been given at the Society's Research Laboratory to questions of heat storage and cooling storage effect, under the joint sponsorship of the TACs on Cooling Loads and Heat Flow Through Glass. Preliminary studies for the development of the concept of an *air conditioning thermal circuit* to portray the significance of the components of heating and cooling loads has attracted much attention. Additional work is planned in the 1953 program of the Committee on Research.

Studies will also be made in 1953 on periodic heat flow through roofs using the special outdoor calorimeter which has proved so valuable in the studies on solar radiation transmission through glass.

Society Membership's Views Requested

At the October 11 meeting of Council the Committee on Research was requested to analyze this comprehensive report in consultation with the Guide and Standards Committees and make recommendations to Council.

The Committee on Research therefore invites your comments and your views on what steps would be appropriate for the Society to take in connection with the questions raised. Your reply should be addressed to the Chairman, c/o ASHVE Research Laboratory, 7218 Euclid Ave., Cleveland 3, Ohio.

*Copies available at $3.50 from BRAB Div. of Engrg. & Ind. Research, National Research Council, Washington 25, D. C.

NOMINATIONS FOR 1953

Officers and Council

The Nominating Committee, selected in accordance with the provisions of **Article VIII** — *Section 3* of the By-Laws, has submitted the following nominees for Officers and members of Council for 1953:

President

REG F. TAYLOR, Houston, Tex.

First Vice President

LOUIS N. HUNTER, Johnstown, Pa.

Second Vice President

JOHN E. HAINES, Minneapolis, Minn.

Treasurer

JOHN W. JAMES, Chicago, Ill.

Members of Council

Three-Year Term

IRWIN W. COTTON, Indianapolis, Ind.
ARTHUR W. EDWARDS, Cincinnati, Ohio
LEON T. MART, Kansas City, Mo.
E. R. QUEER, State College, Pa.

One-Year Term

BRUCE L. EVANS, St. Louis, Mo.

Respectfully submitted,
NOMINATING COMMITTEE
M. W. Bishop, *Chairman*
D. M. Allen, *Vice Chairman*
C. B. Gamble, *Secretary*

A. B. Algren	A. J. Hess
B. W. Farnes	W. G. Hole
E. L. Crosby	B. M. Kluge
W. A. Grant	A. J. Offner

G. T. Donceel, *Alternate*

In accordance with the provisions of the Society's By-Laws, ballots containing the names of the above candidates will be sent to the membership prior to the Annual Meeting in January.

Article VIII

Section 4. Other Nominations. Nominations of officers and members of the Council, other than those nominated by the Nominating Committee, and nominations of members of the Committee on Research, other than those nominated by the Council, may be made in writing by at least fifty (50) members eligible to vote, upon presentation of such nominations, with each nominee's consent, to the Executive Secretary at least sixty (60) days prior to the opening of the first session of the Annual Meeting, whereupon the nominees' names shall be placed upon the ballot with a notation that they are presented by members independent of the Nominating Committee.

Section 5. Voting. Voting at any meeting may be in person or by proxy, but only the Executive Secretary and MEMBERS of the Society shall be eligible to act as proxies. Proxies shall not be valid for more than three (3) months from dates of execution. The Executive Secretary and the MEMBERS acting as proxies shall hold the ballots of their principals secret and confidential. Voting for election of officers, Council members, members of the Committee on Research, on proposals to amend these By-Laws, and on questions required to be referred to the Society pursuant to *Article V, Section 2*, shall be by secret ballot. In the event of any tie vote, the Council shall decide the vote.

Section 6. Ballots. Together with notice of the Annual Meeting, the Executive Secretary shall forward appropriate proxies and ballots to members entitled to vote. The proxies and ballots shall contain spaces for write-in names.

Members of Committee on Research

The election of the Committee on Research is governed by the By-Laws for the election of Officers, with the exception that members of the Committee on Research are nominated by the Council.

In accordance with the provisions of **Article VII** — *Section 3 (h)* the Council announces the nomination of the following members of the Committee for election to succeed those members whose present terms expire January 1953.

Committee on Research

Three-Year Term

RICHARD S. DILL, Washington, D.C.
FRANK H. FAUST, Bloomfield, N.J.
ROBERT W. KEETON, M.D., Chicago, Ill.
HAROLD A. LOCKHART, Morton Grove, Ill.
JOHN W. MCELGIN, Philadelphia, Pa.

One-Year Term

ARTHUR J. HESS, Los Angeles, Calif.

Article VII

Section 3. General Committees. (h) Committee on Research, consisting of fifteen (15) MEMBERS, nominated by the Council or as provided in *Article VIII, Section 4*, and elected by the Society in the manner of elected officers. . . . . .

A · S · H · V · E

Reg F. Taylor
Houston, Tex.
President

Louis N. Hunter
Johnstown, Pa.
First Vice President

John E. Haines
Minneapolis, Minn.
Second Vice President

John W. James
Chicago, Ill.
Treasurer

Nominees For 1953 Committee on Research

Three-Year Term

Richard S. Dill is chief, Heating and Air Conditioning Section, National Bureau of Standards, Washington, D. C., and is the author of many technical papers. Subjects covered in his writings include:

R. S. Dill
Washington, D.C.

Domestic Heating and Air Conditioning; Thermal Insulation of Dwelling Houses; A Survey of Test Methods and Rating Limits for Domestic Heating Devices; Dampness in Basements and Ground Floors; and Condensation in Buildings.

Mr. Dill has served as vice chairman of the Society's Committee on Research, chairman of the Publication Committee, chairman of the Guide Publication Committee, chairman of the Air Cleaner Committee, and as a member of several Technical Advisory Committees including the Technical Advisory Committees on Instruments, Fuels and Combustion, Weather Design Data, and Panel Heating. He is a past president of the Washington, D. C. Chapter of ASHVE, and is a member of the *American Society of Mechanical Engineers*, the *American Society for Testing Materials*, the Washington Building Congress, the Washington Academy of Sciences and the Engineers' Club of Washington. He is a registered engineer in the District of Columbia.

Mr. Dill was born at New Bern, N. C., in 1901. He received a B.S. degree in Mechanical Engineering from the North Carolina State College of Agriculture and Engineering, Raleigh, in 1923.

✦

Frank H. Faust, manager, Product Planning and Marketing Research Service, Air Conditioning Division, General Electric Co., Bloomfield, N. J., was born on April 11, 1905, in Salt Lake City, Utah. He attended Sheffield Scientific School, Yale University, from which he received his B.S. in 1926. Mr. Faust also took a course in industrial physiology at the Harvard University School of Medicine, and a course in air conditioning at Case Institute of Technology. During his association with General Electric, he took the company's advanced engineering course and courses in heating, air conditioning, sales analysis, and better business management.

Mr. Faust was an assistant instructor at Yale University for one year and in 1926 joined the General Electric Co., with which he has been connected ever since. Mr. Faust has served the company in the following capacities: Testing Department, 1926-28; Domestic Refrigerator Engineering Division, 1928-29; Commercial Refrigerator Engineering Division, 1929-31; Engineering General Department, 1931-32; Air Conditioning Department, as commercial engineer, 1932-47; and as manager of Commercial Engineering Division, 1947-49.

Mr. Faust is a contributor to the Society's HEATING, VENTILATING, AIR CONDITIONING GUIDE, is associate editor, Section VIII of the Applications Volume, *ASRE Data Book*, and was editor-in-chief of the 1951 edition of the *Handbook of Oil Burning*.

Mr. Faust joined the Society in 1930 and was a member of the Joint Committee for Rating Commercial Refrigerating Equipment, a joint committee with *ASRE*, and is currently a member of the Joint Committee for Revision of Code of Minimum Requirements for Comfort Air Conditioning, a joint committee with *ASRE* and *ASME*.

F. H. Faust
Bloomfield, N.J.

He is also a Council member of the *American Society of Refrigerating Engineers*, and a member of the *National Fire Protection Association*, serving as chairman of its Committee on Air Conditioning, and Tau Beta Pi, the honorary engineering fraternity. Mr. Faust is vice chairman of the Code Drafting Committee and is a member of the B-9 Code for Mechanical Refrigeration Committee of the *American Standards Association*.

✦

Robert W. Keeton, M.D., Chicago, has had a distinguished career as a practicing physician, investigator and teacher. He was formerly professor and head of the Department of Internal Medicine at the University of Illinois, where he directed the teaching and research activities of some 225 physicians who held faculty appointments in the department. Dr. Keeton retired from the Medical School of the University of Illinois on August 31, 1951.

Born in West Point, Miss., on July 7, 1883, Dr. Keeton received A.B.

degrees from Cumberland University, Lebanon, Tenn., 1903; Millikin University, Decatur, Ill., 1905; and the University of Chicago, 1907, which he attended during the summer quarters from 1902 to 1907 inclusive. He returned to the University of Chicago in 1909 and was graduated in 1914 with an M.S. degree, and in 1916 received his M.D. degree from Northwestern University.

Dr. Keeton served as an assistant in physiology at the University of

R. W. Keeton, M.D.
Chicago, Ill.

Illinois from 1910-12; as adjunct professor of physiology and biochemistry at Albany Medical College, 1912-14; and as an assistant and instructor in pharmacology at Northwestern University and the University of Illinois, respectively, from 1914-16 and 1918-20. During 1920-21 he was assistant professor of pharmacology and therapeutics at the University of Illinois; and from 1922-25 was an associate member of the Otto S. A. Sprague Memorial Institute, and on the staff of Presbyterian Hospital. Dr. Keeton was associated continuously with the University of Illinois from 1925, serving as associate professor and professor of medicine from 1925-33, and head of the Department of Medicine from 1934-51. He has been a practicing physician in internal medicine in Chicago since 1918.

Dr. Keeton joined the Society in 1943, and for many years has directed cooperative research on physiological reactions of persons in different environments sponsored by the ASHVE at the Illinois School of Medicine. Papers reporting this work have been presented at Society meetings and published in the JOURNAL and TRANSACTIONS. In addition, Dr. Keeton is the author of more than 125 major publications.

He is also a member of the *American Physiological Society, American Society of Pharmacology, Society of Experimental Biology and Medicine, Association of American Physicians, The Central Interurban Club, Chicago Society of Internal Medicine, The Institute of Medicine of Chicago,* among many other organizations.

✦

Harold A. Lockhart, chief engineer, Bell & Gossett Co., Morton Grove, Ill., was born at Nashville, Tenn., in 1906. Brought up in St.

H. A. Lockhart
Morton Grove, Ill.

Paul and Minneapolis, he obtained a Bachelor of Mechanical Engineering degree from the University of Minnesota.

After graduation, he worked as a research engineer for the Insulite Co., Minneapolis, doing work on insulation board. He later worked with Stott Stoker Co., St. Paul, as design engineer and production manager.

For the past eighteen years, he has been chief engineer at Bell & Gossett Co. where he has been in complete charge of the engineering department and has been a part of the rapid development and growth in the hot water heating industry.

He has served one three-year term on the Committee on Research and on several TACs as follows: Fluid Flow in Pipes, 1941-42; Panel Heating and Cooling, Group B, 1948-52; Hot Water and Steam Heating, 1950-52; Sound and Vibration Control, chairman, 1952.

He is a licensed engineer in the State of Illinois and also belongs to the *American Society of Mechanical Engineers,* and Theta Tau and Pi Tau Sigma fraternities.

✦

John W. McElgin, vice president in charge of engineering, John J. Nesbitt, Inc., Philadelphia, was born in 1906 at Newark, N. J. He attended Drexel Institute of Technology, Philadelphia, graduating in 1930

J. W. McElgin
Philadelphia, Pa.

with a B.S. in Mechanical Engineering.

Mr. McElgin joined Nesbitt, Inc. in 1930 and has been associated continuously with the firm ever since that date. Starting as a research engineer, Mr. McElgin was appointed chief engineer in 1938, and in 1946 became vice president, which position he now holds.

Mr. McElgin is a member of the Philadelphia Chapter, having served as its president in 1949-50. He is the author of several papers, including The Distribution of Steam in Heat Transfer Surface and Calculation of Coil Surface Areas for Air Cooling and Dehumidification, both of which were published in the Society's JOURNAL and TRANSACTIONS.

He is also a member of the *American Ordnance Association* and the Old York Road Country Club.

✦

One-Year Term

Arthur J. Hess, president, Hess-Greiner & Polland, Los Angeles, was born in 1904 at Pasadena. He attended the University of California at Los Angeles and Berkeley, and the

University of Southern California, studying civil engineering.

In 1929 he was in the contracting business and in 1930 he entered the practice of consulting engineering. From 1936 to the present he has been engaged in the application and sale of engineering products. Some of his designing work included stages at the 20th Century-Fox Studio, the heating, ventilating and air conditioning in the Co-op wind tunnel at Pasadena and at Curtiss-Wright; and he also designed the Earhart Research Laboratory, California Institute of Technology.

He is a member of the Southern California Chapter of ASHVE and was its president in 1941, having

A. J. Hess
Los Angeles, Calif.

served as vice president in 1940, secretary in 1938-39 and treasurer in 1937. He was a member of the Committee on Promotion of Research in 1947-48, and is currently serving as chairman, Chapters Conference Committee, and is a member of the Nominating Committee (serving as chairman in 1951), Chapter Relations Committee, Committee on Research, and also a member of the Technical Advisory Committees on Air Conditioning as Affecting Plant and Animal Husbandry and Sensations of Comfort.

A licensed engineer in the State of California, he has written several articles including Air Conditioning in Moving Picture Studios; Evaporative Cooling; Air Conditioning in Film Laboratories; and Plant Research in the Phytotron.

He is also a member of the *American Society of Refrigerating Engineers* and Chi Epsilon.

HONORED BY LIFE MEMBERSHIP

J. Morgan Kipe was born in 1887 near Kennett Square, Pa., where he attended public schools and later attended the Peirce School of Business Administration in Philadelphia.

Mr. Kipe began his career with Roberts Leinau, a Philadelphia contractor specializing in hotel, office building, commercial and institutional heating work. As a result he became interested in the heating field and resigned to join the heating department of The Crane Co. where he remained for two years estimating heating requirements. Following a five-year association with Peirce, Butler, Peirce & Co. in a similar capacity, he took a sales position with the Spencer Heater Co. in 1915.

During World War I, Mr. Kipe was given a leave of absence by the Spencer Heater Co. to serve in the Heating Equipment Procurement Division of the Office of the Quartermaster General, Washington, D. C.

In 1922 he became Philadelphia district manager for Spencer, a position he held until 1932 when he was appointed special representative for the company. In this latter capacity he also made and maintained contacts with the Engineering Departments of the Army, Navy, Air Corps, and with the Post Office Department in Washington, D.C.

In 1937 he resigned to become Director of Education for *The Anthracite Institute*, the position he now holds. Under Mr. Kipe's direction a series of schools, attended by more

J. Morgan Kipe
Havertown, Pa.

than 10,000 men and women engaged in selling anthracite, have been conducted in anthracite's primary marketing area.

Personal Notes

F. C. Brandt, a member of the Society since 1943, was recently promoted to southwestern sales manager of the Minneapolis-Honeywell Regulator Co.

Mr. Brandt started with the company in the sales department in 1936. He was assigned to the company's Chicago factory two years later and in 1940 became sales engineer in the air conditioning division at Houston. He rose to sales manager of the division, and subsequently to commercial sales manager of the southwestern region.

He was formerly a member of the Board of Governors of the South Texas Chapter of ASHVE.

T. S. Carley, an associate member of ASHVE since 1945 and formerly southwestern regional manager for the Minneapolis-Honeywell Regulator Co. in Dallas, was recently appointed manager of the company's midwestern sales region with headquarters in Chicago. Mr. Carley joined Minneapolis-Honeywell in 1935. He started in the production department, transferred to the sales department four years later and, before becoming southwestern regional manager, served consecutively as sales engineer in San Francisco, sales manager of the company's stoker and wholesale division, and manager of the company's Detroit office.

G. D. Kingsland, Eureka, Mo., a member of the ASHVE since 1935 and an associate member of the *Associated Sheet Metal, Air Conditioning and Heating Contractors of St. Louis, Inc.*, and Perry Guest, an associate member of the Society since 1939, and owner of the P. L. Guest Sales Co., Greensboro, N. C., were recently appointed sales representatives for The Windmaster Corp., Columbus, Ohio.

Buckingham Fountain in Grant Park

Chicago in January '53

CHICAGO will be the gathering place for heating, ventilating, and air conditioning engineers from all over the continent from January 26-29, 1953. These are the dates of the 59th Annual Meeting of the Society and the 11th International Heating, Ventilating and Air Conditioning Exposition. The Society headquarters will be at the Conrad Hilton Hotel.

On the Society's last visit to Chicago in 1949, a record-breaking 2,500 members and guests registered, and the Committee on Arrangements of the Illinois Chapter is anticipating an even larger turn out this year. The Committee's personnel, headed by W. A. Kuechenberg and G. W. Bornquist, chairman and vice chairman, respectively, is now complete.

The program of technical sessions as approved by Council will feature panel heating, data on shading devices, aluminum duct studies, and a symposium on odors.

In addition, there will be several events of interest to members and their wives, and there will be an entertaining round of ladies' activities to take place during the day. Among the entertainment highlights will be a gala Monday night party and the Annual Banquet to be held on Wednesday, January 28. Several inspection trips to local plants are planned by the Committee, and an exclusive style show will be presented for the ladies.

The Annual Meeting will be held during the same week as the 11th International Heating, Ventilating, and Air Conditioning Exposition at the International Amphitheatre. This will be the largest Exposition of its type to date. It will feature a Society exhibit demonstrating some of the results of Society research, both at the Research Laboratory and cooperating institutions. Members and their guests will be welcomed at this exhibit which will be located in Booth 325 on the second floor of the Amphitheatre. The Society will also have an information center in Booth 905 on the main floor. The Exposition will be opened on Monday, January 26 at 2:00 p. m. and remain open until 10:00 p. m.; Tuesday through Thursday the hours will be 12:00 noon to 10:00 p. m.; and on Friday, January 30, the final day, the Exposition will be open from 12:00 noon to 6:00 p. m.

Typical Railroad Rates* From Chapter Cities to Chicago
(Effective October 1)

CITY	RAILROAD ROUND-TRIP	PULLMAN LOWER BERTH ONE-WAY	CITY	RAILROAD ROUND-TRIP	PULLMAN LOWER BERTH ONE-WAY
Albany	$ 70.30	$ 8.30	New Haven	$ 79.62	$ 8.90
Atlanta	48.50	8.30	New Orleans	54.85	9.95
Baltimore	65.55	8.30	New York	77.70	8.90
Boston	88.46	9.95	Norfolk	72.70	9.95
Buffalo	45.05	5.80	Oklahoma City	46.80	8.30
Charlotte	74.05	11.55	Omaha	29.05	5.80
Cincinnati	26.30	5.00	Ottawa	59.55	8.30
Cleveland	30.15	5.00	Philadelphia	70.00	8.30
Columbus	27.95	5.00	Pittsburgh	40.50	5.00
Dallas	55.70	10.25	Portland	115.00	21.00
Dayton	25.90	5.00	St. Louis	17.05	5.00
Denver	60.40	10.65	Salt Lake City	87.10	14.30
Des Moines	20.90	5.00†	San Antonio	71.00	12.80
Detroit	25.45	5.00	San Francisco	126.45	21.00
Grand Rapids	16.68	5.00	Seattle	115.00	21.00
Greensboro	45.60	9.60	Shreveport	50.10	9.60
Houston	64.70	11.95	Spokane	97.05	18.10
Indianapolis	16.68	5.00	Syracuse	57.75	6.55
Kansas City, Mo.	26.80	5.50	Toronto	41.85	5.80
Little Rock	57.45	6.55	Tulsa	41.25	8.30
Los Angeles	126.45	21.00	Vancouver	114.25	21.00
Memphis	31.80	5.80	Washington, D.C.	65.55	8.30
Minneapolis	23.75	5.00	Wichita	39.20	8.30
Montreal	65.75	8.90	Winnipeg	48.80	8.30

*Fifteen percent Federal Transportation Tax should be added to all fares and pullman rates.
†Via CRIP

PROGRAM 59TH ANNUAL MEETING

THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

The Conrad Hilton Hotel

January 26-29, 1953

Monday—January 26

9:00 a.m. REGISTRATION (Conrad Hilton Hotel)

9:30 a.m. FIRST TECHNICAL SESSION (Conrad Hilton Hotel)

Call to Order

Welcome to Chicago

Greetings by M. W. Bishop, President, Illinois Chapter

Response by Pres. Ernest Szekely

Reports of Officers and Council

A Comparison of Physiological Adjustments of Clothed Women and Men to Sudden Changes in Environment, by Tohru Inouye, F. K. Hick, M.D., R. W. Keeton, M.D., J. Losch, Nathaniel Glickman

Two Methods of Calculating Friction Heads for Pipe Lines, by F. E. Giesecke

2:00 p.m. EXPOSITION — Opening of 11th International Heating, Ventilating and Air Conditioning Exposition (International Amphitheatre). Exposition will open daily from 12 noon to 10:00 p.m., Tuesday to Thursday, and will close at 6:00 p.m. on Friday. ASHVE Booth—No. 325.

Tuesday—January 27

9:00 a.m. REGISTRATION (Conrad Hilton Hotel)

9:30 a.m. SECOND TECHNICAL SESSION (Conrad Hilton Hotel)

Report of Tellers of Elections

Suggestions for Measuring Air and Water Flow When Testing Return Line Low Vacuum Pumps, by H. S. Bean

The Bacteria and Odor Control Problem in Occupied Spaces, by R. L. Kuehner

Heat Transmitted to the I-B-R Research Home from the Inside Chimney, by W. S. Harris and R. J. Martin

Fuel Consumption Analysis for Multi-Family Housing Projects, by Rutcher Skagerberg and J. E. Phifer

2:30 p.m. THIRD TECHNICAL SESSION (Conrad Hilton Hotel) RESEARCH ADMINISTRATION

Participation by Colleges in Research, by E. A. Walker

Government Sponsored Research — A Canadian View, by R. F. Legget

Industrial Research in the Business of Comfort, by W. H. Kliever

Wednesday—January 28

9:00 a.m. REGISTRATION (Conrad Hilton Hotel)

9:30 a.m. FOURTH TECHNICAL SESSION (Conrad Hilton Hotel)

Friction Losses in Round Aluminum Ducts, by F. W. Hutchinson

Pressure Losses in 4-Inch Diameter Galvanized Metal Duct and Fittings, by H. G. Conn, W. G. Colborne, and W. G. Brown

Pressure Loss Characteristics of Small Diameter Round Duct Systems, by G. R. Whitnah and J. V. Borry

Room Air Distribution Research for the Improvement of Year-Round Air Conditioning — Part I, by S. F. Gilman, H. E. Straub, A. E. Hershey, and R. B. Engdahl

2:30 p.m. FIFTH TECHNICAL SESSION (Conrad Hilton Hotel)

Report of Committee on Research, by I. W. Cotton, Chairman

Field Studies of Floor Panel Control Systems, by A. B. Algren, E. F. Snyder, Jr., and J. S. Locke

Heat Exchanges in a Ceiling-Panel-Heated Room, by L. F. Schutrum, G. V. Parmelee, and C. M. Humphreys

The Shading of Sunlit Glass: An Experimental Study of Slat-Type Sun Shades, by G. V. Parmelee, W. W. Aubele, and D. J. Vild

7:00 p.m. ANNUAL BANQUET (Conrad Hilton Hotel)

Presentation of Memory Book to Dean L. E. Seeley

Presentation of Past President's Emblem to Ernest Szekely

Presentation of F. Paul Anderson Medal

Thursday—January 29

9:00 a.m. REGISTRATION (Conrad Hilton Hotel)

9:30 a.m. SIXTH TECHNICAL SESSION (Conrad Hilton Hotel)

Maximum Downward Travel of Heated Jets from Standard Long Radius *ASME* Nozzles, by Linn Helander, Shee-Mang-Yen, and R. E. Crank

Air Velocities in Ventilating Jets, by G. L. Tuve

Summer Cooling in Research Residence No. 2 at University of Illinois — 1952, by H. T. Gilkey, D. R. Bahnfleth, and R. W. Roose

Installation of Officers

Unfinished Business

New Business

Resolutions

Adjournment

According to C. F. Roth, president of the International Exposition Co., management for the Exposition, it will be the greatest event of its kind ever held. He states that one noteworthy trend is implied by the introduction of new appliances by established manufacturers with increased emphasis on gas-burners and interchangeable gas-oil set-ups.

Other apparent trends discernible from exhibitors' planning include pipe distribution methods for forced warm air heating; perimeter heating by means of warm air wall curtains; and added interest in baseboard radiation. A wide variety of new diffusers will be shown, including some designed exclusively for perimeter heating.

Forced hot water heating systems, with a number of improvements over present models, both in radiation methods and circulating pumps, will be shown.

Furnace and boiler units will be exhibited in very great number, exemplifying every conceivable type of construction and the utmost variety of design packaged boilers will be in evidence ranging in size from 15 hp to 500 hp units.

A large segment of the Exposition will deal with various aspects of the air conditioning problem, including filtration, purification, air movement, heating and air cooling. Humidification units will be a part of many of these displays. Fans and blowers, both axial and centrifugal, will be featured, as well as cooling towers. A variety of room and unit air conditioning units will be shown.

Looking north on Michigan Ave., Wrigley Building is at left

The Exposition will be open by invitation to all members of the Society, and by invitation and registration to engineers, architects, builders, contractors, distributors and dealers in heating, ventilating and air conditioning equipment.

If you have not yet completed your plans to attend the Annual Meeting, do so at once as advance reservations indicate that this meeting will be the largest in the Society's history. The Committee on Arrangements and the entire membership of the Illinois Chapter are looking forward to welcoming Society members, their wives and guests to Chicago in January.

Committee on Arrangements

W. A. Kuechenberg, *General Chairman*
G. W. Bornquist, *Vice Chairman*

Honorary Chairmen
H. M. Hart S. R. Lewis A. C. Willard

Banquet Committee — H. G. Chapin, *Chairman;* C. M. Burnam, Jr., C. A. Imming, P. J. Marschall, R. T. Murphy, E. E. Sundeen, J. F. Tobin.

Entertainment Committee — J. S. Kearney, *Chairman;* W. H. Brackett, G. B. Coffey, A. L. Crump, W. F. Christmann, J. A. Dell, F. E. Moran, H. B. Ross, Henry Seetch, W. A. Stahl, H. G. Swart.

Finance Committee — G. G. Freyder, *Chairman;* H. E. Anderson, H. J. Couch, T. L. Smith.

Ladies Committee — Mrs. G. W. Bornquist, *Chairman;* Mmes. M. J. Bamond, C. M. Barnes, M. W. Bishop, C. M. Burnam, Jr., H. G. Chapin, J. F. Cummiskey, G. G. Freyder, H. G. Gragg, T. V. Johnson, J. S. Kearney Herbert Kreisman, W. A. Kuechenberg, P. J. Marschall, J. H. Milliken, W. G. Pennington, C. E. Price, G. V. Zintel.

Plant Inspection Committee — C. M. Barnes, *Chairman;* John Gazlay, C. A. Gustafson, F. W. Kramer.

Publicity Committee — T. V. Johnson, *Chairman;* E. G. Avery, M. J. Bamond, S. F. Rost.

Reception Committee — H. G. Gragg, *Chairman;* Herbert Kreisman, *Co-Chairman;* M. J. Bamond, Thomas Cranage, A. L. Crump, L. P. Lang, G. A. Mansinger, R. D. Mach, O. A. Moran, W. G. Pennington, J. J. Philippi, J. C. Scott, L. H. Streb, F. W. Thompson, W. F. Christmann.

Sessions Committee — J. F. Cummiskey, *Chairman;* Norman Bueter, A. M. Bladen, Thomas Cranage, E. H. Gage, N. A. Gregornik, M. F. Koster, Sydney Miner, J. C. Scott, L. H. Streb, E. E. Sundeen, E. R. Teske, R. W. Van Valzah.

Illinois Chapter Officers

President	M. W. Bishop
Vice President	H. G. Chapin
Treasurer	G. G. Freyder
Secretary	G. V. Zintel

Board of Governors

C. M. Barnes G. W. Bornquist H. G. Gragg
Herbert Kreisman

Summary of Chapter Meetings*

OTTAWA VALLEY CHAPTER RECEIVES CHARTER

President Szekely (left) presents Charter to Bernard Stotesbury *(center)* with J. H. Fox *(right)*

The Ottawa Valley Chapter, the newest Society Chapter and the fourth Canadian Chapter to be organized, received its Charter on Tuesday, September 16, in the Prescott Hotel, Ottawa, at a dinner meeting.

Ernest Szekely, Milwaukee, president of the Society, presented the Charter, assisted by J. H. Fox, Toronto, member of Council. The Charter was accepted by Bernard Stotesbury, president of the Ottawa Valley Chapter. W. G. Hole, president of the Montreal Chapter, presented President Stotesbury with a gavel.

Other officers elected to serve for the first term are: *Vice President* —G. L. Ostiguy; *Secretary* — E. J. Schoenherr; and *Treasurer* — W. J. Robinson.

Congratulatory messages, welcoming the new sister Chapter, were received from about 50 Chapters in the United States and Canada.

Representatives from the Toronto and Montreal Chapters attended the meeting, in addition to some 50 charter members of the new group.

• *ARKANSAS*: Two local architects were the speakers at the Chapter's August meeting — E. F. Brueggeman and George Trapp. Contrary to the usual architectural viewpoint, Mr. Brueggeman suggested that the sales engineer collaborate with the consulting engineer in the selection of equipment rather than the architect. Mr. Trapp brought out that the architect is primarily interested in the end result. A question and answer period concluded the meeting.

Pres. E. N. Pettit called the meeting to order in the Albert Pike Hotel following a social period. Attendance 20. Attendance ratio 0.39.

• *CENTRAL OHIO*: J. M. Vorys, local congressman, was the speaker at the September meeting. Mr. Vorys spoke on government spending and waste, making particular mention of the fact that 80 percent of the country's money is used for past, present, and future wars. An interesting question and answer period followed the fine talk.

Following an excellent chicken dinner, a short business session preceded the address. Attendance 50. Attendance ratio 0.54.

• *EMPIRE STATE CAPITAL*: The highlight of the September program was an address on *Research in Panel Heating* by P. B. Gordon, vice president of Wolff & Munier, Inc., New York City. Mr. Gordon's talk outlined what has already been done in this field under the Society's Research Program along with a preview of what is planned for the future. The talk was supplemented with slides and was followed by a question and answer period.

Pres. Harry Horowitz called the meeting to order at the Crossroads Restaurant. Attendance 28.

• *KANSAS CITY*: C. S. Stock, manager of Unit Ventilator Division, Herman Nelson Division of American Air Filter Co., Moline, Ill., presented a film on the basic service of unit ventilators in class room heating. In his talk, Mr. Stock explained that experiments were conducted on unit ventilators in five classrooms in one school having east, west, north and south exposures, adding that 10,000 readings were taken daily. The graphic representation of the readings taken were shown in the film, bearing out the need for individual room control throughout the cycle of operation in school rooms dependent upon occupancy, outside wind and temperature as well as sun exposure.

In the business meeting that preceded the talk, reports were given by the various committee chairmen. Pres. W. A. Reichow called the

*Note: The attendance ratios shown represent the membership attendance divided by the chapter membership. These ratios will be useful as a partial indication of interest shown by local chapter members in various types of subjects programmed by the various chapters and may be useful in deciding on subjects for chapter meetings.

September meeting to order in the Wishbone Restaurant. Attendance 100. Attendance ratio 0.40.

• *SOUTHERN CALIFORNIA*: Prof. Norman Sharpe, head of the Refrigeration and Air Conditioning Department, California State Polytechnic College, was the speaker of the evening. He delivered an excellent address on *Air Purification*, with special emphasis on its effects on people. A comparison of the results with various types of contaminants and different methods of purification was also given.

Pres. J. S. Earhart called the September meeting to order in the Carolina Pines Restaurant; and prior to the main address of the evening, Dean Harold Hayes of the Engineering Division of California State Polytechnic College, gave a brief talk on the training of students at the College. Attendance 53. Attendance ratio 0.14.

• *SOUTHWEST TEXAS*: The feature of the August meeting was an address given by Carl Dill, chief engineer with Reynolds Metals Co. at the new plant in Gregory, Tex. A film illustrating the production of aluminum products from mining ore, smelting and production from ingots to finished sheets, rolls and foil accompanied the address. Following the showing of the film, Mr. Dill discussed the application of aluminum products to the air conditioning industry for duct work, reflective foil insulation sheets, aluminum roofs for reflection of large percentages of solar heat with consequent reduction on cooling load, among many other uses.

Pres. W. E. Long called the meeting to order in the Officer's Club at the Naval Air Station in Corpus Christi. Attendance 33. Attendance ratio 0.44.

• *SOUTHWEST TEXAS*: The Chapter was host to a number of visitors from the South Texas Chapter at its July meeting, among them Reg F. Taylor, nominee for president of the Society, and D. M. Mills, Council Member.

Mr. Taylor, consulting engineer from Houston, was the speaker of the evening. Prior to the main address, Mr. Taylor reported on the activities at the Semi-Annual Meeting in Spring Lake, N. J., and then proceeded to his subject, *Yesterday, Today and Tomorrow, as Related to the Society*. He traced the progress and growth of the Society from its initial beginning of one Chapter and seventy-five members to its present size of 50 Chapters and some 8,000 members. Mr. Taylor made special mention of the value the research work conducted at the Society's Laboratory and the ASHVE GUIDE is to industry. He then went into further detail, describing the work being accomplished by the Society through its 18 technical advisory committees and along with the research projects in effect at the 12 cooperating institutions in the U. S.

Preceding Mr. Taylor's talk, Mr. Mills announced that the 60th Annual Meeting was to be held in Houston in 1954, and he solicited the assistance of the Southwest Texas Chapter in making meeting arrangements. Attendance 33. Attendance ratio 0.38.

• *WISCONSIN*: R. D. Rodwell in introducing the speaker of the evening, N. W. MacNichol, assistant manager of Radiator and Unit Heat Sales for Warren Webster & Co., Camden, N. J., pointed out that Mr. MacNichol was particularly qualified to speak because of his background and experience. He also acts as Exhibits Manager and assists in preparation of technical literature, and has had a very impressive war record, having served as a Lieutenant in command of an LCI, which participated in amphibious operations in the Pacific and the Mediterranean.

Mr. MacNichol outlined the recent developments of forced hot water perimeter heating, pointing out that perimeter baseboard heating dates back to the turn of the century, and that tests were made at the University of Illinois on low-height radiation, but it was not until 1940 that research was undertaken in a serious manner.

He also pointed out that there were three methods of piping for baseboard forced water perimeter heating, one method being the two-pipe hookup, another method being the one-pipe hookup with the conversion fittings, and the third and simplest hookup was the series-loop connected system. He illustrated various series loop piping arrangements by the use of slides and pointed out that with this arrangement the flow of water cannot be interrupted so that the heat output from the baseboard radiation has to be controlled by dampers in the cabinet or by bypassing the water around the heating element.

Mr. MacNichol also illustrated that a very low temperature difference exists from floor to the ceiling with the use of baseboard radiation, and further stated that baseboard radiation makes for better comfort heating due to the fact that the cold surfaces, such as the outside walls, are at a higher temperature than with concentrated radiation. In conclusion, he pointed out that perimeter heating is now being used in office buildings, dormitories, and apartment house projects, and that perimeter heating is also used with steam.

After an interesting question and answer period the September meeting, which was held at the Engineering Society of Milwaukee building, was adjourned with a rising vote of thanks to the speaker. Attendance 150. Attendance ratio 0.31.

STUDENT BRANCH

• *UNIVERSITY OF DETROIT*: The purpose of the meeting was the election of new officers for the coming semester, and the following were elected: *President*—T. J. Feaheny, Jr.; *Vice President*—D. L. Prentice, Jr.; *Secretary-Treasurer*—W. F. Thull; and *Reporter*—Edmund Osterman.

Following the election, a discussion on the best way to promote increased student interest in the branch was held with the past officers of the branch. It was proposed that the ASHVE and *ASME* Student Branches hold joint meetings, the programs being arranged so as to be of equal interest to both groups. Attendance 8. Attendance ratio 0.54.

Candidates for Membership

The Society's By-Laws require that all applications for membership or advancement are to be sent to the Executive Secretary and the names of applicants and their references shall be printed in the next issue of the JOURNAL of the Society, or mailed to all members. When the replies are received from references the Candidate's application shall be submitted to and acted upon by the Admission and Advancement Committee as soon as possible.

When the Admission and Advancement Committee has acted favorably upon a Candidate's application and assigned his grade, the Council shall confirm the election of the proposed Candidate for membership. During the past month there have been 78 applications for membership, including 4 student applications and 2 reinstatements; in addition 10 advancements have been received. The names of these men and their sponsors are published in the following list.

Members are requested to scrutinize the list with care. The Admission and Advancement Committee, and in turn, the Council, urge members to assume their share of responsibility of receiving these candidates into membership by advising the Executive Secretary promptly of any whose eligibility for membership is in any way questioned.

All correspondence in regard to such matters is strictly confidential, and is solely for the good of the Society, which it is the duty of every member to promote.

Unless objection is made by some member by November 28, 1952, these candidates will be voted upon by the Council. Those elected to membership will be notified by the Executive Secretary immediately after election.

Note: †Reinstatement. *Non-member. △Advancement.

Alabama

GRAF, L. G., Owner, Graf's Tin Shop, Cullman. REFERENCES: H. H. Feaster, J. B. Saliba, H. K. Walden, W. B. Yarbrough.

Arkansas

BULLARD, W. A., Repr., Peerless Sales, Little Rock. REFERENCES: Morris Benkovitz, R. E. Blaylock, R. D. Elgin, E. N. Pettit, Jr.

DE MAINE, O. B., Sales Engr., Comfort Air Conditioning Co., Pine Bluff. REFERENCES: J. P. Cleary, J. C. Coplin, Jr., C. H. Miller, J. B. Woods.

HILL, A. S., JR., Repr., Peerless Sales, Little Rock. REFERENCES: Morris Benkovitz, R. E. Blaylock, Herman Cumnock, R. D. Elgin.

California

DELAVAN, M. J., Asst. Mech. Engr., Luppen & Hawley, Inc., Sacramento. REFERENCES: E. B. Green*, J. E. Marshall, L. A. O'Meara, E. E. Phillips.

MULLINS, L. L., Repr., Johns-Manville Sales Corp., Sacramento. REFERENCES: J. E. Day, E. C. McKinsey, L. A. O'Meara, E. E. Phillips.

Connecticut

FLAGG, PETER, Pres., C. N. Flagg & Co., Inc., Meriden. REFERENCES: E. J. Hoagland, D. M. Hummel, R. C. Murphy, R. B. Sweet.

Georgia

†CARDER, W. W., Sales Engr., Powers Regulator Co., Atlanta. REFERENCES: S. W. Boyd, E. R. Foss, H. K. McCain, F. A. Player.

Illinois

△HOCHSCHULZ, ALFRED, Owner, Moto Ventilating Co., Chicago. REFERENCES: M. W. Bishop, A. H. Blaker, D. B. Scheidecker, G. V. Zintel.

△STRAUB, H. E., Research Assoc., University of Illinois, Urbana. REFERENCES: M. K. Fahnestock, J. R. Fellows, S. Konzo, R. J. Martin*.

Iowa

FODERBERG, M. E., Control Technician, Iowa State College, Ames. REFERENCES: M. E. Gould, W. E. Petersen, W. A. Schworm, D. E. Wells.

HOWARD, R. T., JR., Head Draftsman, William E. Nanes Co., Des Moines. REFERENCES: W. G. Barnard, T. R. Johnson, W. E. Nanes, B. A. Schwirtz.

MELLERUP, G. E., Repr., William B. Schuler, Des Moines. REFERENCES: D. C. Murphy, J. F. Sandfort, R. H. Schnell, W. B. Schuler.

Kansas

HICKS, E. R., JR. Engr., Oakle P. Bullock, Cons. Engr., Wichita. REFERENCES: O. P. Bullock, E. G. Fahnestock, H. M. Skalla, H. D. Speyer.

MANSION, D. L., JR. Engr. Oakle P. Bullock, Cons. Engr., Wichita. REFERENCES: O. P. Bullock, E. G. Fahnestock, H. M. Skalla, H. D. Speyer.

Kentucky

DUGGAN, R. B., Designer, American Radiator and Standard Sanitary Corp., Louisville. REFERENCES: C. W. Holtman, H. E. Manning, L. F. Smith, Herwart Werker.

KRAFFT, KURT, Mgr., Htg. Div., American Radiator and Standard Sanitary Corp., Louisville. REFERENCES: C. W. Holtman, H. E. Manning, L. F. Smith, Herwart Werker.

Louisiana

BREEDEN, J. O., Sales Engr., Southern Heater Co., Inc., New Orleans. REFERENCES: Ralph Elizardi, E. A. Smith, H. N. Stall, S. P. Stone, Jr.

DART, JOHN, JR., Sales Engr., Johnson Service Co., New Orleans. REFERENCES: N. A. Bortz, J. C. Cox, R. M. Hood, R. S. Oyer.

Maryland

GOLDMAN, T. D., Mech. Engr., Whitman Requardt and Associates, Baltimore. REFERENCES: F. A. Leser, L. S. MacGann, H. A. Naylor, Jr., E. H. Taze.

Michigan

HAAS, R. B., Owner, R. J. Haas & Son, Vicksburg. REFERENCES: F. W. Brundage, N. A. Buckley, L. G. Miller, R. W. Wilson.

MOLLER, R. A., Assoc. Editor, Mayer Publishing Co., St. Joseph. REFERENCES: E. N. Foss*, Fenton Howard*, Benjamin Linsky, L. E. Peterson.

SACHS, D. J., Engr.-Designer, The E. R. Little Co., Inc., Detroit. REFERENCES: O. K. Griffith*, W. T. Kellogg, E. R. Little*, H. H. Parker*.

SAHLIN, T. M., Owner, T. Marvin Sahlin, Cons. Mech. Engr., Benton Harbor. REFERENCES: R. W. Mangrum, F. K. Platt, A. H. Snook, R. L. Wells.

Minnesota

ALLENDORF, M. L., Warm Air Htg. Inspector, Building Dept., City of Minneapolis, Minneapolis. REFERENCES: Ralph Anderson*, Howard Betts*, Arthur Hovda, D. L. Oslund.

BOWERS, L. S., Mgr., Htg. and Air Cond. Dept., Goodin Co., Minneapolis. REFERENCES: R. T. Haley, O. E. Loberg, L. K. Reisberg, W. K. Shine.

†HOVDA, A. F., Warm Air Htg. and Air Cond. Inspector, City of Minneapolis, Minneapolis. REFERENCES: A. B. Algren, L. J. Krause, C. E. Lund, D. L. Oslund.

JOHNSON, A. W., Estimator, Castle Plumbing & Johnson Heating, Minneapolis. REFERENCES: A. B. Algren, M. H. Bjerken, J. V. Borry, J. E. Johnson.

MORRIS, J. K., Asst. to the Director, University of Minnesota Engineering Experiment Station, Minneapolis. REFERENCES: A. B. Algren, C. E. Lund, F. B. Rowley, M. S. Wunderlich.

SUTTON, D. J., Research Engr., Minneapolis-Honeywell Research Laboratory, Minneapolis. REFERENCES: A. B. Algren, J. V. Borry, C. T. Hastings, P. E. McNall*.

△Weatherston, R. N., Vice Pres., Pierre Aircon Co., St. Paul. References: J. A. Craig, O. L. Lilja, R. W. Otto, William Sturm.

Mississippi

Lambeth, W. H., Cons. Engr., Jackson. References: J. L. Coleman, Burt Lomax, Jr., R. S. Oyer, V. F. Self.

Missouri

Braden, W. D., Sales Engr., The National Radiator Co., St. Louis. References: J. B. Killebrew, R. M. Skinner, Louis Steckhan, J. C. Watkins.

Murray, M. J., Sales Mgr., Siemon Manufacturing Co., Kansas City. References: R. F. Johnson, C. D. Jones, E. E. Ralston, W. A. Reichow.

Nevada

Adlish, J. J., Htg. and Air Cond. Contr., Adlish Supply Co., Reno. References: Frank Capriutti*, R. E. Hansen*, Morris Stewart*, B. V. Van Wagenen.

New Jersey

△Goodman, M. J., Partner, Maurlee Co., Woodbury. References: Penhart Colen*, A. L. Corbman, L. L. Sobel, H. A. Wohlrab.

New York

Becker, A. L., Factory Repr., Albany, N. Y. References: C. D. Cross, R. W. Nelson, F. W. Sheldon, R. J. Tougher.

Carpenter, R. W., Sales Engr., Minneapolis-Honeywell Regulator Co., Rochester. References: R. A. Baker O. H. Hellekson, J. C. Manion, S. H. Perkins.

△Feldman, N. R., Pres., Vent-o Air Conditioning Corp., Brooklyn. References: Philip Freshman, George Moncher, G. S. Rothenberg, William Rudoy.

Hart, J. E., Engr., J. L. Ottenheimer, Cons. Engr., Albany. References: D. A. Carofano, G. C. Davis, Harry Horowitz, J. L. Ottenheimer.

Kimmel, F. N., Partner, Fred H. Kimmel Co., Rochester. References: J. W. Baybutt, L. D. Conta, C. H. Dawson, H. W. Leet.

Mitchell, Alexander, Manufacturers' Representative, Albany, N. Y. References: L. Ager*, R. W. Cumming, Herman Kruger, Louis Rosen*.

Stants, H. C., Jr., Pres., Schenectady Engineering & Sales Corp., Latham. References: H. A. Bond, F. W. Sheldon, G. A. Teeling, R. J. Tougher.

North Carolina

△Graham, W. D., Jr., Br. Mgr., The Trane Co., Greensboro. References: G. B. Rottman, W. H. Sullivan, L. L. Vaughan, R. M. Warren, Jr.

Ohio

△Branche, W. H., Controls Dvlpt. Engr., Bryant Heater Division, Affiliated Gas Equipment, Cleveland. References: K. T. Davis, R. J. deFasselle*, L. P. Primosch*, W. R. Teller.

Drummer, J. N., Sr., Mgr., Warm Air, Wet Heat Depts., The Peters Plumbing Co., Dayton. References: F. H. Doench, Jr., F. J. Kroger, O. J. Weber, W. G. Wilkins.

Endejann, R. H., Engr., The Kuempel Co., Cincinnati. References: M. E. Mathewson, E. W. McNamee, B. G. Silberstein, E. A. Sobolewski.

Fiala, W. W., Owner, Industrial Sales Co., Columbus. References: H. R. Allonier, W. R. Funk, J. A. Guy, Julian Speer.

Hackney, W. W., Owner, W. W. Hackney Co., Dayton. References: F. H. Doench, Jr., M. O. Heapy, R. J. Perkins, C. D. Weaver, Jr.

Heath, S. L., Owner, Heatco Equipment Co., Columbus. References: H. R. Allonier, R. S. Curl, J. A. Guy, R. W. Pirrung.

Mason, N. K., Pres., Mason Supply Co., Columbus. References: E. Graff*, R. Hunter*, Ralph Liebert*, Julian Speer.

McGovern, R. A., Associate, A. F. McGovern, Columbus. References: J. A. Guy, R. M. Keatts, C. F. McGovern, J. D. Slemmons.

Oklahoma

Landers, W. A., Owner, W. A. Landers Co., Oklahoma. References: J. H. Carnahan, W. J. Collins, Jr., W. W. Frankfurt, W. B. Loeffler.

Oregon

Busch, J. F., Partner, Copenhagen & Co., Portland. References: D. L. Benz, L. D. Copenhagen, J. E. Finkbeiner, Edwin Hunt.

Lord, G. H., Estimator, P. S. Lord, Mech. Contractors, Portland. References: H. H. Hewitt, Jr., J. D. Kroeker, J. P. McDermott, T. E. Taylor.

Reed, E. S., Owner, Acme Htg. & Sheet Metal Works, Grants Pass. References: Leo Hungerford, Jim Hunter*, D. M. Keefer, J. A. Reynolds.

Pennsylvania

Stake, N. S., Mgr., Commercial Sales Dept., Minneapolis-Honeywell Regulator Co., Pittsburgh. References: J. J. Kelly, B. B. Reilly, T. F. Rockwell, B. R. Small.

Stewart, S. D., Field Engr., Stelwagon Manufacturing Co., Philadelphia. References: George Innes*, C. G. Smith*, John Thomas*, Victor Wills*.

Walters, J. E., Jr., Estimator, W. H. Walters & Sons, Philadelphia. References: M. F. Blankin, C. F. Dietz, H. H. Erickson, A. E. Kriebel.

South Carolina

△Demarest, R. K., Jr., Mech. Engr., Wm. G. Lyles, Bissett, Carlisle & Wolff, Columbia. References: R. F. Donovan, W. E. Kerr, H. E. McKenzie, Charles Sockwell, Jr.

Mason, J. T., Engr., Minneapolis-Honeywell Regulator Co., Greenville. References: H. W. Frederick, B. A. Leppard, G. R. Morgan, R. M. Warren, Jr.

Tennessee

Bibb, R. L., Jr., Engr., Nashville Machine & Supply Co., Nashville. References: W. C. Armstead, E. E. Bryan, J. R. Potter, W. F. Swats, Jr.

Texas

Getts, W. H., Repr., Toole & Cunningham, Houston. References: J. W. Holland, J. H. Poole, O. G. Rivoire, R. J. Salinger.

Haubold, R. E., Application Engr., Westinghouse Electric Corp., Houston. References: W. E. Long, J. W. Marshall, A. J. Natkin, R. J. Salinger.

Mossman, R. F., Engr., Carrier Corp., Dallas. References: A. G. Allen, F. L. Gray, H. C. Hoffman, J. P. Licandro.

Williams, R. F., Jr., Air Cond. Engr., Thermal Engineering Corp., Houston. References: W. M. Andrews, J. C. Fontana, M. G. Lockwood*, F. J. Newnam*.

Washington

△Fowler, F. L., Engr., Minneapolis-Honeywell Regulator Co., Seattle. References: D. C. Griffin, Kenneth Hansen*, F. W. McCarthy, Chester Winn*.

Canada

Beaudoin, Antonio, Asst. Engr., Crane Ltd., Montreal. References: J. P. Fitzsimons, L. A. Hood, J. L. Knight, W. W. Timmins.

Bennett, G. B., Htg. Engr., Crane Ltd., Toronto. References: A. B. Chanter*, P. W. Knee*, J. A. Norton, G. L. Wiggs.

Breithaupt, J. D., Mgr., Radiant Heating Division, Page-Hersey Tubes Ltd. References: L. M. Bennett, D. M. McLeod*, T. S. Medland*, J. H. Ross.

Christie, G. T., Chief Engr., Alpha Manufacturing Co., Ltd., Winnipeg. References: R. C. Cawker*, J. W. Greenlaw*, N. B. Jorgensen, J. W. Powlesland.

Decker, D. B., Repr., Empire Brass Manufacturing Co., Winnipeg. References: D. F. Kenney, Ernest Lambert, W. D. Swain, K. D. Wotten.

Hale, G. K., Owner, Hale-Co. Metal Products Ltd., Vancouver. References: S. C. Gale, R. D. Hale, M. E. Minaker, S. W. Welsh.

Hale, R. H., Co-Owner, Hale-Co. Metal Products Ltd., Vancouver. References: S. C. Gale, R. D. Hale, M. E. Minaker, S. W. Welsh.

McAdam, J. C., Heating Sales Engr., B. C. Electric Co., Ltd., Vancouver. References: J. M. Bird, D. B. Leaney, D. W. Thomson, W. F. Wiggins.

Mould, W. A., Asst. Mgr., English and Mould, Ltd., Toronto. References: C. J. Bootes, E. C. Fox, William Philip, J. H. Ross.

Taylor, G. A., Agent, Bogue Electric of Canada, Ltd., Toronto. References: D. L. Angus, F. D. Ledgett, A. C. Ritchie, J. H. Ross.

Watson, R J., Ontario Repr., Vapor Car Heating Co. of Canada, Ltd. References: R. P. Allsop, R. H. Dyson, W. J. Hiscock, S. M. Peterkin.

Zarnett, B. H., Owner, Air Comfort Engineering Co., Toronto. References: W. R. Blackhall, L. P. Hanson, R. A. Nelson, H. R. Roth.

England

BOWLER, P. T., Contracts Engr., Matthew Hall & Co., Ltd., Manchester. REFERENCES: A. I. Dukes*, Edmund Kenworthy, S. Kindler, R. J. Tindale*.

△FANTON, E. J., Chief Draftsman, Dallow, Lambert & Co., Ltd., Leicester. REFERENCES: S. Alcock*, J. J. Gilbert*, W. H. Skelton*, A. Westwood*.

HOLBECHE, R. H., Sales Mgr., Woods of Colchester Ltd., London. REFERENCES: W. G. Brooks*, H. H. Bruce*, J. W. Cooling*, J. W. Copping*.

WOOLLARD, J. A., Mgr., Matthew Hall & Co., Ltd., Manchester. REFERENCES: E. E. Austen*, P. D. Doulton*, S. Kindler, A. C. F. Mackadam*.

Hong Kong

SHERWOOD, P. J., Refrig. & Air Cond. Engr., Howard & Co., Hong Kong. REFERENCES: John Chan*, H. F. G. Chauvin*, M. E. Goldstein*, S. A. Ismail*.

STUDENT

PURDUE UNIVERSITY, West Lafayette, Ind. CERTIFIED BY: J. G. Clark.
BORTHWICK, R. L.

UNIVERSITY OF MINNESOTA, Minneapolis, Minn. CERTIFIED BY: J. V. Borry.
RUSH, J. R.

UNIVERSITY OF TORONTO, Toronto, Ont., Canada. CERTIFIED BY: F. G. Ewens.
MITCHELL, L. S.
STEVENSON, D. R.

OBITUARIES

FRANK M. ESCH
Houston, Tex.

Word has been received by the Society of the death, early in September, of F. M. Esch. Born in Sandusky, Ohio, on February 7, 1902, Mr. Esch attended the University of Notre Dame, graduating in 1926 with a B.S. in Mechanical Engineering.

At the time of his death Mr. Esch was president of his own firm, Esch Condit, Inc., established in 1951. Prior to this, he was representative for a number of engineering companies. Among the companies he represented are: Sarco Co., Inc., Dollinger Corp., Air Maze Corp., and Palmer Thermometers, Inc.

He was also a member of the Houston Engineers Club and the *National Association of Professional Engineers*.

CLEMENT M. FENKER
Cincinnati, Ohio

C. M. Fenker, assistant chief of engineers for A. M. Kinney, Inc., consulting engineers, died on September 29, following a heart attack suffered earlier at his home.

Born in Covington, Ky., Mr. Fenker attended the University of Cincinnati, graduating with a B.S. in Electrical Engineering in 1915. Following graduation, he joined Walter G. Franz, consulting engineers, for whom he did design and supervision work until 1918, when he resigned to join Fosdick and Hilmer, also consulting engineers, in the same capacity. Between 1923 and 1939 he was associated with Ed. J. Schulte, architects, in the capacity of designer and supervisor of all mechanical work. He joined Kinney, Inc., in 1939.

Mr. Fenker is survived by his widow, Mrs. Mary Sullivan Fenker, two daughters, two brothers, and one sister, to whom the Officers and Council of the Society express their deep sympathy.

CHARLES H. SPENCER
Salt Lake City, Utah

C. H. Spencer, owner-manager, C. H. Spencer & Co., Salt Lake City, died while on a business trip in Idaho Falls, Ia., on July 16. He was born on July 15, 1883, in Salt Lake City and attended the University of Utah.

Mr. Spencer joined The Progress Light and Power Co. as branch manager in 1910, and from 1914 to 1921 he operated his own company, suppliers of equipment to electric light and power plants. He then joined the Delco Light and Frigidaire Co. as district manager, serving in this capacity until 1931, when he went with The Stokermatic Co. as supervisor of sales. He again organized his own firm, C. H. Spencer & Co., distributors of industrial and power plant equipment, which enterprise he was engaged in at the time of his death.

Mr. Spencer was very active in both civic and church affairs. A worker in the Church of Jesus Christ of Latter-day Saints, Mr. Spencer fulfilled a mission to Holland while attending the University of Utah. One of the first scouters in Utah, beginning his work in 1911, he had recently received a pin in recognition of forty years of scouting work. Mr. Spencer was also a member of the Exchange Club and at one time was a member of the *National Association of Power Engineers, Inc.*

He is survived by his widow, Mrs. Martha Spencer, a daughter, Mrs. Helen Nelson, and three sisters and one brother, to whom the Officers and Council of the Society extend their deep sympathy.

PHILIP KALMAN
Houston, Tex.

Philip Kalman, manager, Rodgers-Barbeck Co., Houston, passed away in the early part of September.

Mr. Kalman, born on January 23, 1912, in Houston, attended the University of Texas, graduating in 1935 with a B.S. in Mechanical Engineering. Following graduation, he joined Reed Rollpe Bituminous Co., as sales engineer, after which he became connected with the Petty Geophysical Engineering Co. of San Antonio, where he served as assistant computor from 1936-37. Between 1938-40 he was a draftsman and estimator for Straus-Frank Co., Houston, and between 1940 and 1947 he served as a heating, ventilating, air conditioning, and piping engineer with the Brown Shipbuilding Co. and its subsidiary, Brown & Rout, Inc. Mr. Kalman joined Rodgers-Barbeck in 1948 as a sales engineer.

THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

Headquarters: 62 Worth St., New York 13, N. Y. Research Laboratory, 7218 Euclid Ave., Cleveland, Ohio

OFFICERS

President.....Ernest Szekely
First Vice President.....Reg F. Taylor
Second Vice President.....L. N. Hunter
Treasurer.....J. Donald Kroeker
Executive Secretary.....A. V. Hutchinson
Technical Secretary.....Carl H. Flink

COUNCIL

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● **SOUTHERN CALIFORNIA:** 1930. Hdqrs., Los Angeles, Calif. Meets, First Tuesday. PRESIDENT, J. S. Earhart, 2734 Fleur Dr., San Marino (9). SECRETARY, C. D. Walz, 3600 San Pasqual St., Pasadena (10).

● **SOUTHERN PIEDMONT:** 1952. Hdqrs. Charlotte, N.C. PRESIDENT, R. M. Warren, Jr., P.O. Box 1755, Charlotte. SECRETARY, J. A. Rice, P.O. Box 1755, Charlotte.

● **SOUTHWEST TEXAS:** 1946. Hdqrs., San Antonio, Tex. Meets, Third Tuesday. PRESIDENT, W. E. Long, Dept. of Mechanical Energ., University of Texas, Austin. SECRETARY, L. H. Hornor, Jr., 810 Insurance Bldg.

● **UTAH:** 1944. Hdqrs., Salt Lake City, Utah. Meets, Third Thursday. PRESIDENT, D. R. Wilde, 2634 S. 19th E. (5). SECRETARY, Alfred Richeda, P.O. Box 479 (9).

● **VIRGINIA:** 1946. Hdqrs., Norfolk, Va. Meets, Third Wednesday. PRESIDENT, D. F. Phillips, P. O. Box 674, Newport News. SECRETARY, H. E. Marquart, 111 W. Main St. (10).

● **WASHINGTON, D. C.:** 1935. Hdqrs., Washington, D. C. Meets, Second Wednesday. PRESIDENT, G. R. Walz, 5214 25th Pl. N., Arlington (7) Va. SECRETARY, W. C. Reamy, Jr., 17th & Pennsylvania Ave., N.W. (6).

● **WESTERN MICHIGAN:** 1931. Hdqrs., Grand Rapids, Mich. Meets, Second Monday. PRESIDENT, H. R. Limbacher, 760 E. Vine St., Kalamazoo. SECRETARY, F. K. Platt, P.O. Box 307, Kalamazoo.

● **WESTERN NEW YORK:** 1919. Hdqrs., Buffalo, N. Y. Meets, Second Monday. PRESIDENT, J. M. Quackenbush, 505 Franklin St. (2). SECRETARY, Q. P. Thompson, 360 Richmond Ave. (22).

● **WISCONSIN:** 1922. Hdqrs., Milwaukee, Wis. Meets, Third Monday. PRESIDENT, J. A. Lofte, 2505 N. 97th St., Wauwatosa (10). SECRETARY, I. J. Rossiter, 231 W. Wisconsin (3).

STUDENT BRANCHES

● **NORTH CAROLINA STATE COLLEGE:** 1948. Hdqrs., Raleigh, N. C. PRESIDENT, Sydney Narvey, 5-B Vetville, State College Station. SECRETARY, E. A. Travis, Jr., P.O. Box 3333, Bagwell Dormitory.

● **OKLAHOMA A. & M. COLLEGE:** 1950. Hdqrs., Stillwater, Okla. PRESIDENT, Stuart Cohen, 513 ½ Knoblock. SECRETARY, H. G. Rice, 5 Chickasha, Box 417, Vets Village.

● **OREGON STATE COLLEGE:** 1949. Hdqrs., Corvallis, Ore. Meets, First Wednesday after First Tuesday. PRESIDENT, D. W. Blair, 223 W. 15th St. SECRETARY, C. D. Cannon, 404 N. 26th St.

● **PURDUE UNIVERSITY:** 1948. Hdqrs., W. Lafayette, Ind. CHAIRMAN, N. J. Kirch, 922 Highland Ave., Lafayette. SECRETARY, H. F. Allen, Jr., 629 University St.

● **TEXAS A. & M. COLLEGE:** 1946. Hdqrs., College Station. Meets, Second and Fourth Tuesday. PRESIDENT, J. O. Kadel, Box 4034. SECRETARY, W. C. Haggard, Box 5227.

● **UNIVERSITY OF DETROIT:** 1949. Hdqrs., Detroit, Mich. Meets, First Tuesday. PRESIDENT, T. J. Fealney, Jr., 18265 Oak Dr. (21). SECRETARY, W. F. Thull, 18313 New Jersey (19).

● **UNIVERSITY OF KANSAS:** 1949. Hdqrs., Lawrence, Kans. Address mail to Dr. Warren E. Snyder, chairman, Dept. of Mechanical Engineering, University of Kansas.

● **UNIVERSITY OF TEXAS:** 1949. Hdqrs., Austin, Tex. Meets, First and Third Tuesday. PRESIDENT, W. A. Cox, 360-D Deep Eddy Apts. SECRETARY, V. H. Miles, PHP Dorm J.

● **UNIVERSITY OF TORONTO:** 1951. Hdqrs., Toronto, Ont. CHAIRMAN, J. A. Slemin, 21 Wilberton Rd. SECRETARY, T. O. Smith, 455 Avenue Rd.

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EXTRA LARGE COMBUSTION CHAMBER for the efficient burning of any fuel — oil, gas, or coal, stoker or hand-fired.

RAPID WATER CIRCULATION induced by the concentration of heat at the high point of the fire-box crown sheet, brings *more water* in contact with *more heating surface* in a given time. The result is:

QUICK HEAT TRANSFER, with no time lag to cause waste of fuel. Here is a saving that adds up. The bigger the building the bigger the saving.

FITZGIBBONS CONSTRUCTION THROUGHOUT meaning certified flange quality steel, rigid adherence to the ASME. code in all construction details, hydro-static test before shipment, and rating as per the Steel Boiler Institute Rating Code. There are no stronger guarantees of boiler quality.

This is the quality boiler that is supplying heat in thousands of commercial and public buildings. Eighteen sizes, from 528,000 Btu to 10,200,000 Btu. For details and specifications write for the "D" Type Bulletin.

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A steel boiler is a lifetime investment —sell "the best in steel boiler heat"—

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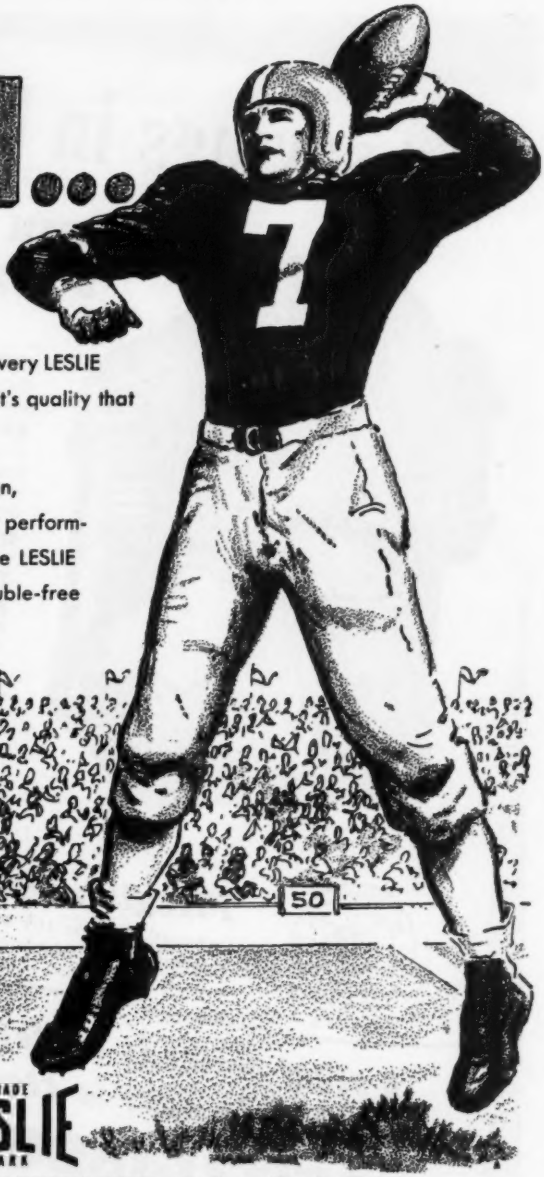
Dependable Control...



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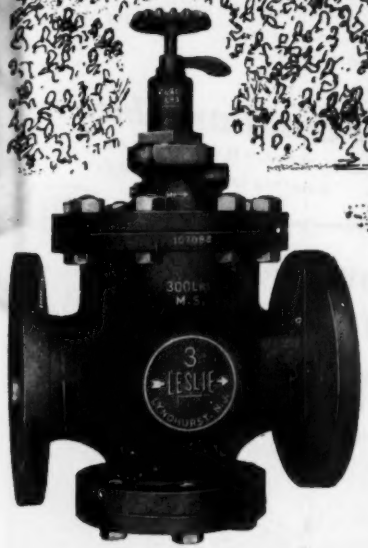

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Write for illustrated bulletin on type of regulator desired. 1708

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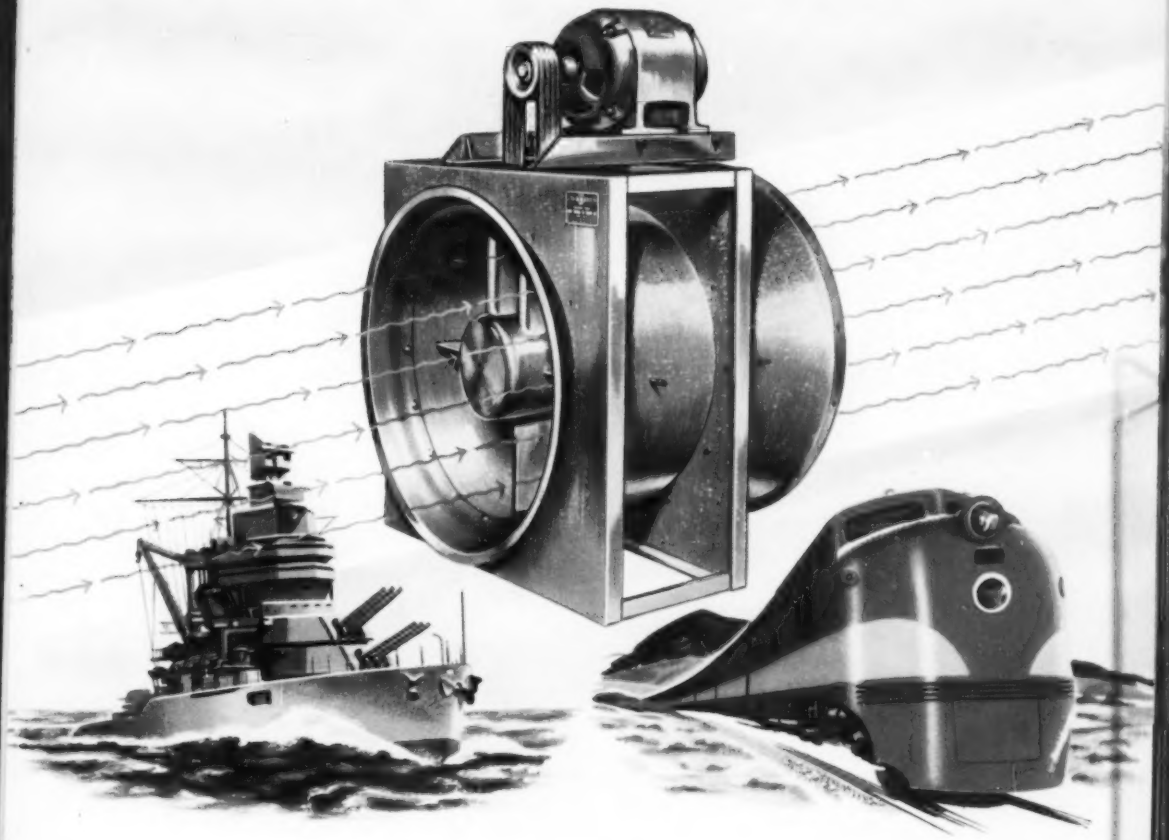

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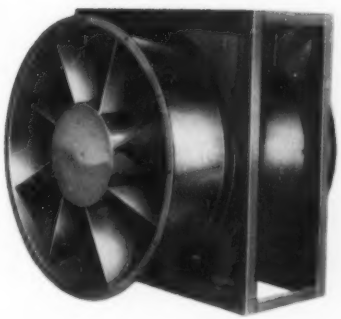

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Why Burn Down Your House for Roast Pig?

IN ancient China, men ate meat raw. But one day, while Ho-ti the swineherd gathered mast for his hogs, his stupid son Bo-bo, playing with fire, burned down their straw hut. Bo-bo sniffed the odor of burnt pig. He touched one to see if it was still alive, scorched his fingers, put them in his mouth and was amazed at the delicious taste. Father came home and caught his son devouring a pig. Ho-ti tried one, too, found it intoxicatingly sweet and satisfying.

Thereafter, neighbors observed feverish building of new straw huts at Ho-ti's, followed always by conflagrations. The secret leaked and fires became widespread. In a few weeks even his Lordship's town house was on fire. Finally, straw for hut building disappeared from the market and young pigs could not be had for love or money. At last, after many generations, a wise man arose who said that a pig could be roasted without burning down an entire house.

Thousands of years later, we Americans feast deliriously on "roast pig." Accompanying our delights are fires of inflation, which can destroy our values just as certainly as the roasting of Ho-ti's pigs consumed his earthly possessions. But surely we need not await the coming of a sage to tell us not to burn down our houses to enjoy the delights of roast pig!

Let us unite to stop the ruinous flames of inflation. Curb wasteful and unnecessary government spending. Balance our Federal budget. Control our national debt and reduce taxes. Only in this sane way can we produce more straw and enjoy our houses, raise more pigs and eat them, too.

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RAILROAD TRACK SPIKES - CONDUIT - HOT AND COLD FINISHED CARBON AND ALLOY BARS - PIPE AND TUBULAR PRODUCTS - WIRE - ELECTROLYTIC TIN PLATE - COKE TIN PLATE - RODS - SHEETS - PLATES.

Growing with STUDEBAKER

In the photograph above, taken in 1930 in the Studebaker factory, is shown an early type Wing Featherweight Unit Heater.

In the photograph to the left, taken in 1952 in the Studebaker Truck Assembly building, is shown a late model Wing Featherweight Unit Heater.

The Wing Revolving Unit Heater, not only is the ideal method of heating a plant or building, but may also be used in summer (with the steam turned off) for cooling.

CONGRATULATING the Studebaker Corporation on its hundredth anniversary reminds us that L. J. Wing Mfg. Co. has been supplying Studebaker with heating equipment for over a quarter of a century. Since 1926, over 445 Wing Unit Heaters and Heater Sections have been installed in Studebaker plants. And, as Studebaker has pioneered in many notable automotive improvements, so Wing has led the way in many improvements in heating equipment.

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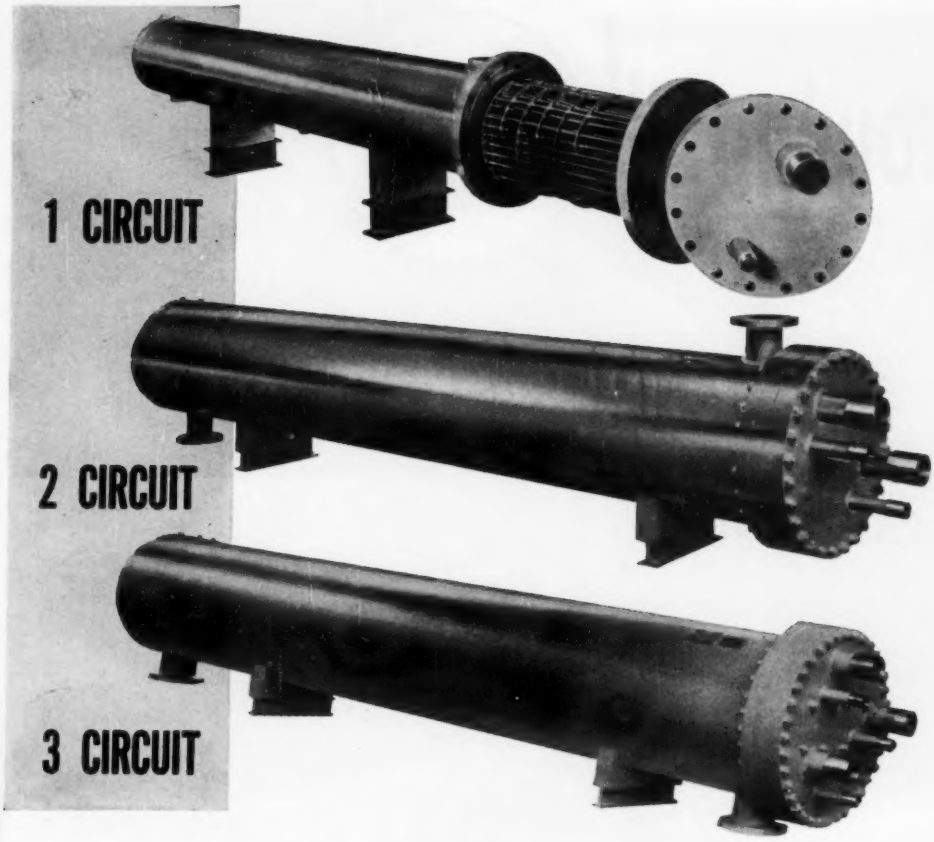

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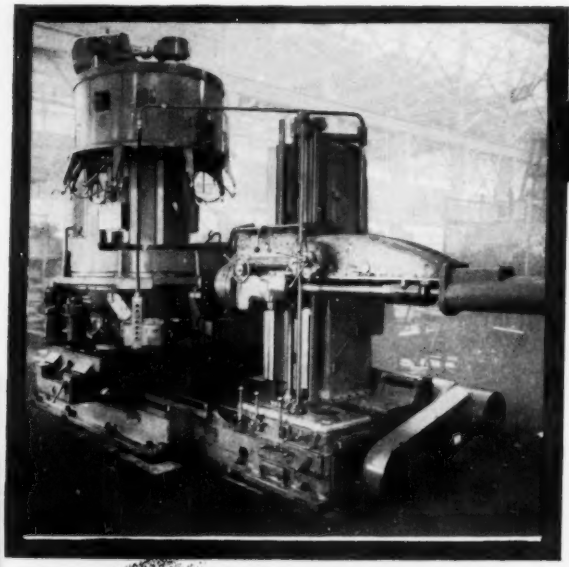


No Trick... Actual Test

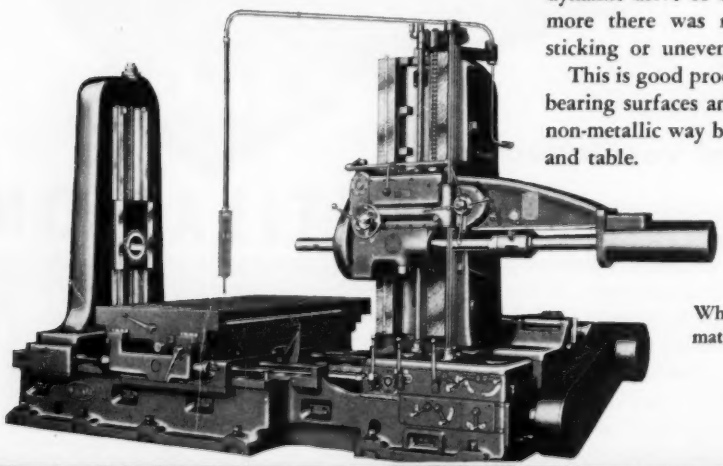
37,000 lb. LOAD . . .

To test the load distribution and ease of action of the table and saddle on the BULLARD new 4-WAY BED HORIZONTAL BORING MACHINE, this test was actually made by placing a Type "D" MULT-AU-MATIC on the table.

This load was placed as illustrated. Hand cranking was used on both table and saddle and both were moved with comparative ease considering the 18½ ton load.

Fine power feed and rapid traverse were then applied and movements made in all directions with extreme smoothness and no overloading of the hydrodynamic drive or drive motor. Furthermore there was no tendency toward sticking or uneven motion.

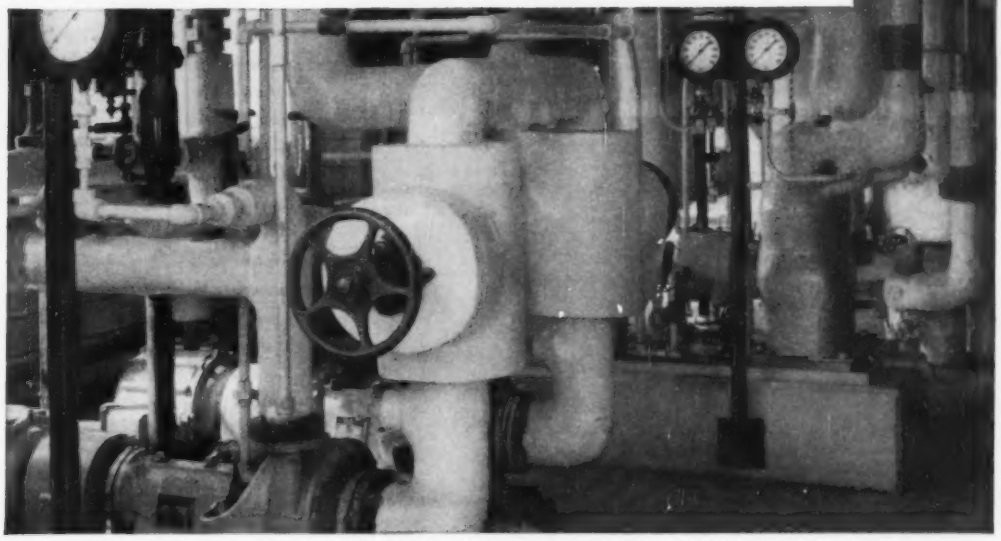
This is good proof of well distributed bearing surfaces and the smoothness of non-metallic way bearings of the saddle and table.



When writing for information refer to BU 206.

You'll agree that Swift's Lagging Adhesive

IS SO EASY TO USE



Tops as a cement and size in the application of modern insulations

Whether the installation calls for the binding of loose insulation after shaping or the sizing of lagging cloth, you can count on Swift's Lagging Adhesive for extra-efficient performance. Application is easy. Brushes on quickly without dragging (at the original consistency). Can be diluted with *plain water* if desired.

Fast setting . . . dries quickly to a strong continuous film.

Safe! Does not support combustion . . . a synthetic resin emulsion, it's free of inflammable solvents and contains fire retardants.

Moisture-resistant . . . protects insulations against sogginess.

Mold-resistant . . . protects against mold and vermin attack.

Saves paint . . . an excellent undercoating for paint, it prevents penetration into lagging cloth . . . helps you go farther with less paint.

Call **SWIFT** first for **ADHESIVES**

Swift & Company
Adhesive Products Department
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(This offer expires December 31, 1952)

Please send me your ___-gal. introductory trial shipment of Swift's Lagging Adhesive at the quantity price, to be tested for use in our operations. We understand, if not fully satisfactory, it may be returned for credit at your expense.

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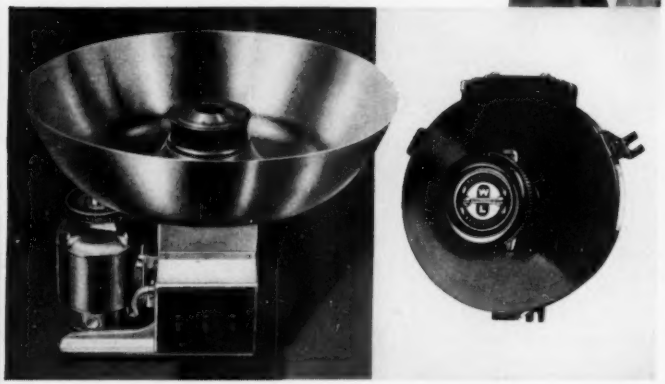
The Electric Candy Floss Machine Co.

"A pink cotton candy machine rheostat must provide exact temperature control"

says John G. Pettyjohn,
John G. Pettyjohn Company, Knoxville, Tennessee,
representative for Ward Leonard Electric Company.



Spinning sugar into fine, fluffy floss for pink cotton candy requires precise heat control. Unless a high degree of heat is closely controlled, candy becomes too thick or too thin. Also, since these machines are used at circuses, traveling carnivals, resorts, and similar places, machines must be able to compensate for variance in voltage and surrounding temperature, depending upon the location.

The Electric Candy Floss Machine Company, Nashville, Tenn., uses Ward Leonard VITROHM plate rheostats in the heater circuits on the spinner heads of their new super deluxe candy floss machines for two reasons: (1) VITROHM rheostats are the only rheostats they have found that would stand up and give good service, (2) they are able to get a much better grade of candy.

Ward Leonard rheostats are available in several multiples of resistance values to meet various operating conditions. Special purpose rheostats requiring non-standard values and tapers can also be supplied.

Ward Leonard's engineering department is always ready to work with you to design or recommend the most economical rheostat for your particular application. Write for Ward Leonard Rheostat Bulletin 60A.

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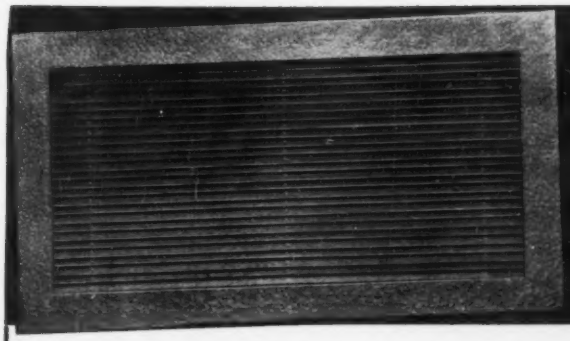

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THIN CORE GRILLE
For Doors & Partitions
1/4" to 3/4" Thick

CUTS INSTALLATION TIME OVER ½!

First Grille ever specifically designed for panels as thin as ¼ inch! Installation time is reduced to only a fraction as much as for any other type grille. Merely cut out section, slip in grille, place telescoping auxiliary frame in place on other side, tighten the two post screws. *You're done!*

EASY TO INSTALL – *Anyone Can Do It!*

No need for a cabinet maker to install this grille. A rough-in carpenter or sheet metal man can do it easily and quickly. The opening can even be cut with a skill-saw. No close fitting required. No nails. No holes to drill. Can even be installed safely after door is painted or varnished!

PRACTICALLY ELIMINATES "SPOILAGE"!

There's almost no chance to ruin an expensive door or panel with this grille. With no holes to position, and nearly a *half-inch* tolerance on all sides, normal errors will not show. The grille and auxiliary frame clamp together tightly, holding the grille in position.

COMPLETE – *No Wood Moldings!*

The A-J Thin Core Grille, with Auxiliary Frame comes to you as a *complete* unit, including posts and screws. There are no wood moldings needed. Makes a neater installation. Strong. No chance for rattle.

STURDY, GOOD LOOKING CONSTRUCTION!

All steel — with inverted "V" grilles allowing 80% free area for air passage, but completely screening vision. Rattle-free core. Reinforcing mullions every 4". Available as core only any size to 36" x 36". Complete with frame — any size. Choice of finishes: Prime coat gray or tan. Hammer-tone in gray or bronze.

ACTUAL SIZE
Cross-Section

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Listing Over 1000 Types & Sizes of Grilles for Every Requirement

A-J MANUFACTURING CO.

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MAIL THIS COUPON NOW!!

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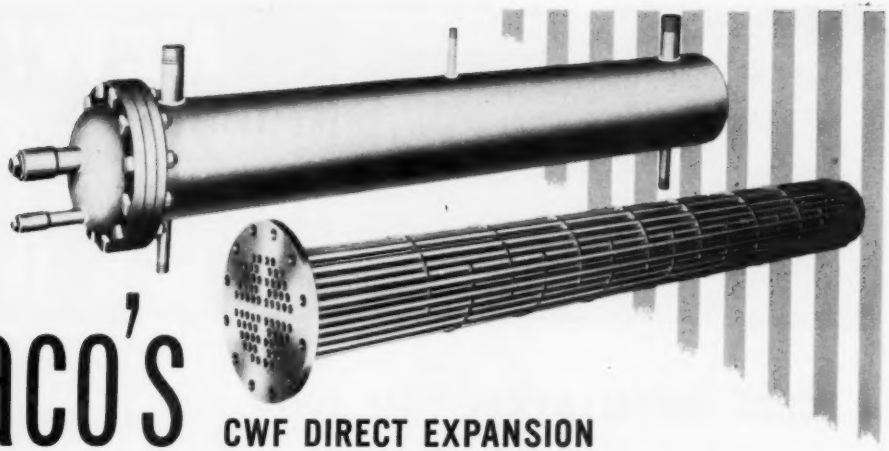
Please rush me full information and prices on "Thin Core Grilles" and your catalog.

Name .....

Firm .....

Address .....

City ..... State .....



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FOR AIR CONDITIONING AND REFRIGERATION CONTRACTORS

Quality Construction and Better Design Give Long Life, Maintenance-Free, Low Cost Operation

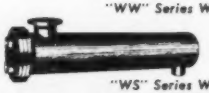
TACO HEATERS, Incorporated, since 1920, has backed heating and air conditioning contractors with the highest quality heat exchangers, such as those illustrated in this ad: water heaters and coolers, fuel oil heaters, condensers, instantaneous water heaters, converters and tank heating units.

Now, Taco has increased its production facilities to match the air conditioning and refrigeration industry's growth. Taco's "know how" in large heat exchanger design and installation is at the service of all its friends in the industry.

Better Heating-Better with Taco

TACO MAKES A WIDE LINE OF SHELL & TUBE HEAT EXCHANGERS
4 of which are shown below

"WW" Series Water Heaters



"WS" Series Water Heaters

"TU" Series Tank Heating Units

Straight Tube Heat Exchangers

TACO HEATERS, INCORPORATED • 137 SOUTH STREET, PROVIDENCE 3, R. I.

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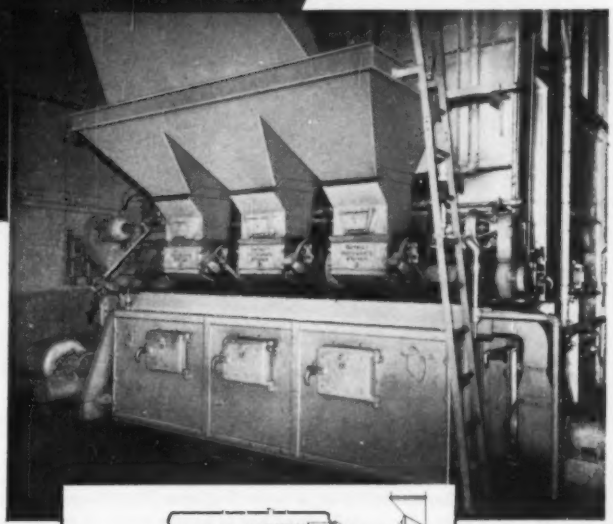
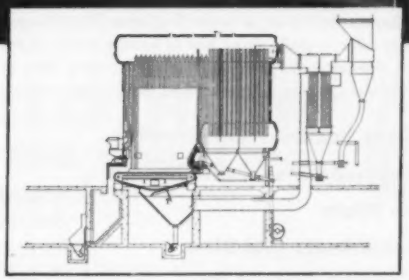
REDUCES COAL COST

Detroit RotoGrate Stoker with Erie City Type VL Boiler at Certain-teed Products Corporation, York, Pa. Capacity 45,000 pounds steam per hour. Operates with preheated air.



THIS Detroit RotoGrate Stoker fired unit has reduced fuel cost 12.6c per thousand pounds of steam at Certain-teed Products Corporation plant at York, Penna., according to report by Mr. W. M. Noon, Combustion Engineer. The reduction in steam cost was made at the same time plant capacity was increased.

The Detroit RotoGrate will save you money and improve your operation. It is the original spreader stoker with forward moving grates that discharge the ash at the front. It handles fluctuating as well as steady loads with high thermal efficiency. • You too can save money with Detroit Stokers. Write for Bulletin.



SINCE 1898

DETROIT STOKER COMPANY

General Motors Building—Detroit 2, Michigan

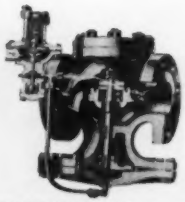
District Offices in Principal Cities • Works at Monroe, Michigan

Looks like we're using
SPENCE REGULATORS
all over our plant

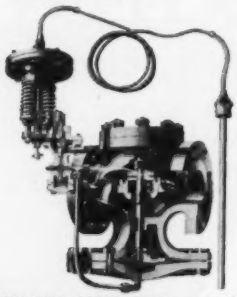
This busy plant has ordered and re-ordered Spence Regulators for two good reasons. (1) Spence offers a *wide-range line* to handle a host of regulating jobs. (2) What's more, Spence units give accurate service year after year. Maintenance is negligible. Over-all costs are low. These design features explain why . . .

- **Single Seat Packless Construction**
- **Large Balanced Metal Diaphragm**
- **Sensitive Pilots**
- **SECO Metal Seats and Discs**
- **Springs out of path of steam**
- **No dismantling for inspection**

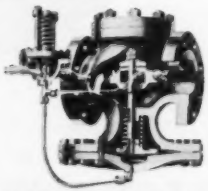
Write for Bulletin 350
for complete details on Spence's line of automatic regulating valves.



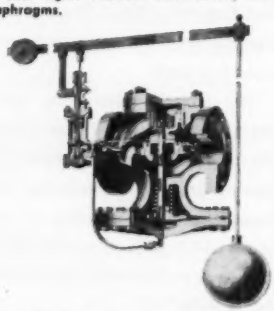
PRESSURE REDUCING—Self-operated, dead-end regulators powered by large, frictionless, metal diaphragms. Sizes ¼ in. to 12 in. Pressures to 600 psi 750F.



TEMPERATURE REGULATING — Combined temperature and pressure control. No separate reducing valve required. Shuts tight, will not wiredraw or be damaged by overheating. Sizes to 12 in.



BACK PRESSURE CONTROL—Wide selection of sensitive pilots to meet exacting requirements. Initial pressure closing, guaranteed to shut tight. Packless construction, metal diaphragms.



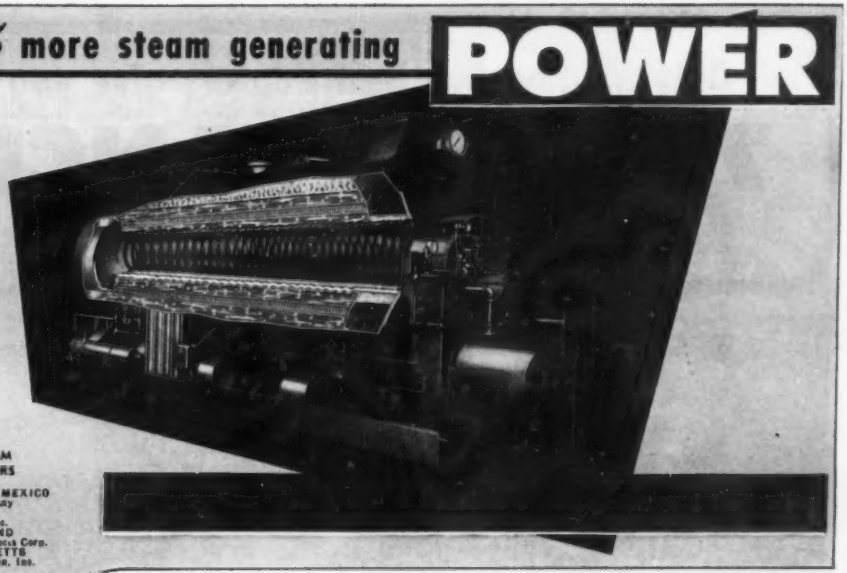
LEVER OPERATED—Pilot lever for connection by cable or mechanical linkage to floats or other devices. Slight actuator motion opens and closes main valve.

SE 116

SPENCE ENGINEERING COMPANY, INC.
WALDEN, NEW YORK

Spence

66% more steam generating POWER



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EXPORT DIVISION

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Meet the Cyclotherm folks at Booth 13C, National Power Show, Grand Central Palace, New York City, December 1-6

Cyclonic Combustion is the revolutionary new flame control that reduces heating surface requirements from 5 to just 3 sq. ft. per boiler horsepower . . . to produce 66% more steam generating power per sq. ft.

Used exclusively in Cyclotherm Steam Generators, Cyclonic Combustion controls flame characteristics in a revolving spiral vortex traveling the full length of the combustion chamber. The cyclonic flame constantly heats every part of the chamber, itself a complete heat transfer unit. 65 to 75% of the heat transfer is obtained in the chamber, with the result that only one return pass is required to deliver a guaranteed minimum efficiency of 80%.

The high efficiency of Cyclonic Combustion, plus simple compact design enables Cyclotherm generators, complete with fiber glass insulation, to save up to ⅓ the space of conventional package steam generators.

Cyclotherm generators operate on gas, oil or a combination of both. Complete combustion of fuel particles in the combustion chamber results in greater fuel savings and eliminates the need for extensive stack facilities. Inspection and cleaning is a minor operation with no time loss caused by boiler shutdown.

Cyclotherm arrives complete . . . 5 easy connections—fuel, electricity, water, steam and a simple flue—and Cyclotherm is ready to generate steam for any purpose. Full power operation from a cold start in 15 to 20 minutes. Boilers are designed for 18 to 500 h.p., 15 to 200 psi pressures.

The Cyclotherm meets all state requirements and is built in accordance with A.S.M.E. and National Board Standards and bears the label of Underwriters Laboratories, Inc.

Proved superior in thousands of installations, Cyclotherm steam generators with Cyclonic Combustion offer the most efficient and compact package steam generator on the market today. Write today for the free illustrated folder.

CYCLOTHERM STEAM GENERATORS

Cyclotherm Division U. S. Radiator Corp.
Dept. 26
Oswego, New York

☐ Please send without obligation my copy of "All Your Questions Are Answered by Cyclotherm."

☐ Please send a Cyclotherm representative to speak to me about Cyclotherm.

NAME_____

FIRM_____

ADDRESS_____

Only Modine Gas Unit Heaters give you all

7 BIG ADVANCES

in store and plant heating

. . . because only Modine builds Gas-Fired Unit Heaters with both *Stainless Steel* heat exchangers and burners

1 LONGER LIFE — Stainless steel construction resists rust and corrosion — adds years of low-cost service.

2 LIGHT WEIGHT — Installation is easier — quicker—less expensive because Modines weigh far less than ordinary units.

3 SMALL SIZE—Modine design eliminates unnecessary bulk — makes unit more compact. Less headroom is required for installation.

4 FASTER RESPONSE — Heat delivery begins within *5 seconds* after thermostat calls for it. No wait for warm-up.

5 BALANCED HEATING — Discharge air temperatures are correctly related to heat throw and air volume.

6 ADDED CONVENIENCE — Thermostatically controlled Modine Unit Heaters require no labor to operate them. No fireman worries.

7 SUMMER COOLING — Fans can be operated with gas shut off to provide controlled air circulation in hot weather.

Remember, too, when you buy Modine, you get the greatest name in Unit Heating. As a leader in the development of steam and hot water unit heaters for over 25 years, Modine can offer you a comprehensive recommendation, based on your exact needs. Modine Gas-Fired Unit Heaters are A.G.A.-approved for natural, mixed, manufactured, L.P., L.P.-air gases.

For complete information, call the Modine representative listed in your phone book classified section. Or write for Bulletin 651, Modine Mfg. Co., 1509 DeKoven Ave., Racine, Wis.

Modine also sets the pace in *steam and hot water* unit heaters — vertical, horizontal and power-throw models. These units, too, have the balanced performance that gives you uniform heating, lower fuel costs.

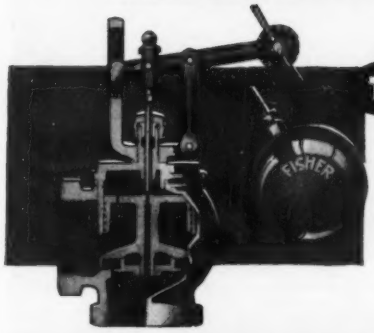
Modine UNIT HEATERS

GU-11-55

DEPEND ON FISHER

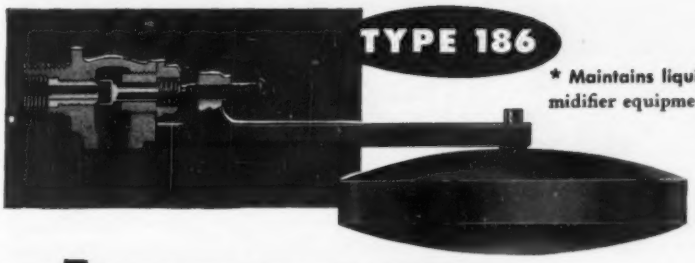
float valves

FOR GENERAL OPEN TANK SERVICE



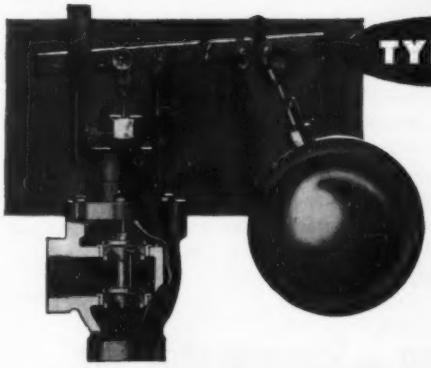
TYPE 171

* Bronze float valve for automatic control of liquid levels in all types of open vessels. Particularly recommended for service where positive shut-off is required. Single seated composition disc inner valve balanced by accurate fitting piston — fluctuating inlet pressures do not affect valve operation.



TYPE 186

* Maintains liquid levels in various types of humidifier equipment or in small tanks where flow rates are moderate. Suitable for all non-corrosive liquids. Composition valve disc assures positive shut-off.



TYPE 17

* Maintains liquid levels in open tanks, vats, reservoirs and similar containers by automatically controlling the flow rate to or from the vessel. Double seated V-port type inner valve provides throttling control — eliminates water hammer. Iron or steel body — bronze, stainless steel or other special metal trim.

Fisher float valves for automatically controlling liquid levels in all types of open vessels are available in various types and designs. Wide selection of body and trim material to handle different liquids. Complete description and details in Bulletin FG-70. Write for your copy today.

FISHER GOVERNOR COMPANY • Marshalltown, Iowa

FISHER

WORLD LEADER IN THE MANUFACTURE OF LIQUID LEVEL CONTROLLERS, PRESSURE REGULATORS AND IN RESEARCH FOR BETTER CONTROL

Where Heating Boilers are designed to Power Boiler Standards

Combustion Engineering Building, New York, with inset showing one of five drafting rooms.

It pays to build high standards of design and construction into heating boiler installations . . . pays in terms of better performance, greater reliability and lower maintenance and operating expense. And with today's high fuel and operating costs, these performance features are more important than ever before.

Because C-E boiler designers are accustomed to meeting the high standards required for large power boilers, they naturally build into the extensive line of C-E heating boilers, features that make for exceptionally efficient and reliable performance.

Thus you can expect something more for your money in a Combustion-built boiler irrespective of its type or size. You can choose from the well-known service-proved line of VU Boilers, equipped for any method of firing and designed for steam capacities ranging up to 60,000 lb per hr. or more; or the C-E Re-circulation Steam Generator — a compact, fully-automatic, packaged steam plant — available in capacities from about 2500 to 6000 lb of steam per hour.

Regardless of your boiler requirements, you can turn with confidence to Combustion, for its knowledge, experience and manufacturing facilities are unsurpassed in the steam generation field. We invite your inquiries and will be glad to discuss plans with you or your representatives, at your convenience.

B-562

Combustion Engineering — Superheater, Inc.

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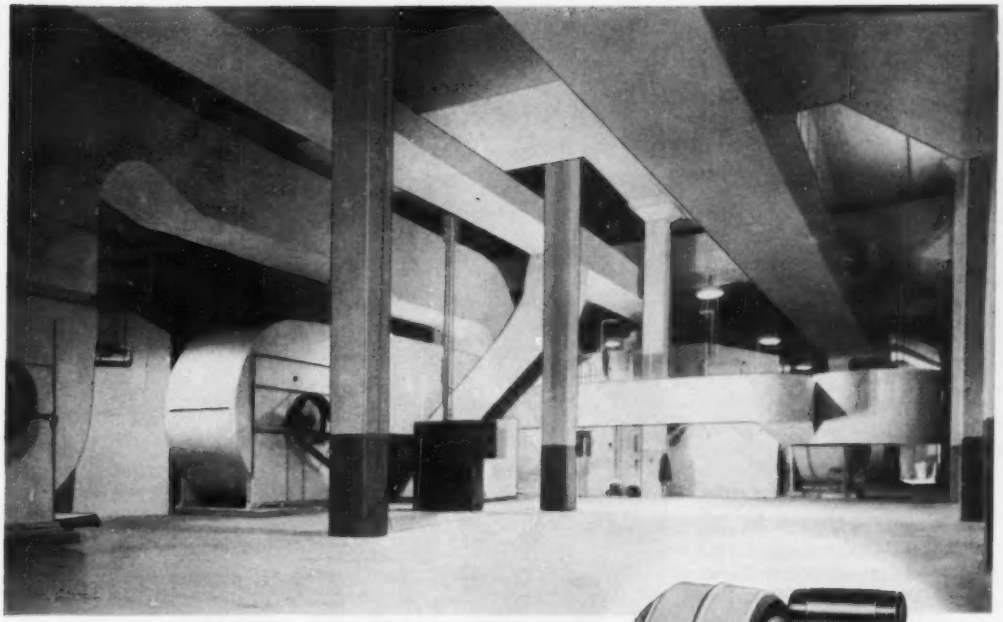
ALL TYPES OF BOILERS, FURNACES, PULVERIZED FUEL SYSTEMS AND STOKERS; ALSO SUPERHEATERS, ECONOMIZERS AND AIR HEATERS



Bayley Direct Driven Vent Set – Type F. Write for a copy of the new Bayley Selector Guide (Bulletin VS-52-1)

Bayley

knows the whole wide field of

AIR HANDLING!

—From Mammoth Custom-Built Installations To Single "Packaged" Ventilating Units

In the solution of your air handling problems — large or small — BAYLEY engineering and service can be relied upon to produce the right answer. . . . With a background of more than fifty years of specialized experience in the field of air handling, Bayley equipment has won the widest confidence on the part of leading architects, engineers, builders and contractors, as well as owners. And with a Bayley Representative in principal cities, your needs will receive prompt, thorough-going attention!

BAYLEY BLOWER COMPANY

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Small in Size and Price—

Here's Utility's new baby that makes tough installations easy—the new *Horizontal* 65,000 BTU and 90,000 BTU Forced Air Furnaces. They're small in size and their flexibility will make them popular with dealers and customers alike. They will fit in most attics or, in many cases, under the house. They are ideal for both new and replacement sales. Utility's Horizontal Forced Air Furnaces don't take up precious floor space... are easy to install... and highly competitive in price. And your net will be greater because there's less ducting, less installation expense.

Giants in Performance!

Utility Horizontal Forced Air Furnaces give large home heating at small home cost, plus years of economical, dependable service. And these models are easiest to sell because of these many superior sales points: Super-quiet Dy-Rekt* Drive Blower... automatic controls... even heat distribution to all parts of the house... semi-compensating air delivery... blower can be used independent of heating unit for home ventilation in hot weather... trouble-free operation. And they save *you* money because they require fewer costly service call-backs!

**Registered*

THIS BABY WILL MAKE YOUR HEATING PROFITS GROW!

SEE THE COMPLETE UTILITY LINE AT YOUR DEALERS

Blowers

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U-1152

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4851 S. Alameda St., Los Angeles 58, Calif.

Please send me FREE information about Utility's new HORIZONTAL FORCED AIR FURNACES and the *complete* Utility Heating line.

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Deliveries NOW!

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Guaranteed air delivery

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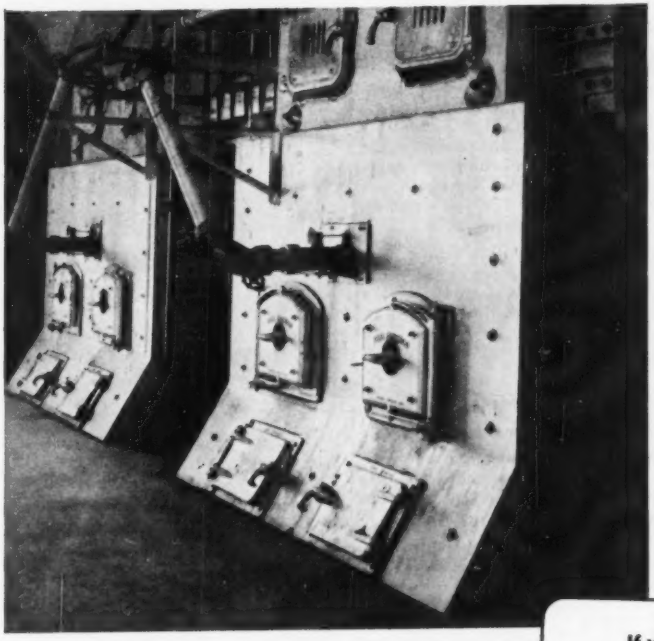
MANUFACTURERS OF AIR COOLERS, BLOWERS, GAFFERS & SATTLER AND OCCIDENTAL AUTOMATIC GAS RANGES

HOW A SMALL PLANT SAVES BIG MONEY— BY BURNING COAL THE MODERN WAY!

"Modernizing our coal installation cut monthly fuel bills from $777 to $650... labor costs from $120 to only $40!"



says Mr. William C. Musch, Chief Engineer, Allen Memorial Hospital, Waterloo, Iowa.

Here's Allen Memorial Hospital's new steam plant. Boilers are fired by pneumatic spreader stokers. The plant now operates with ⅓ the manpower formerly needed. Compared to the old installation, the new equipment saves 18¢ on every thousand pounds of steam generated. The savings realized by this small plant will pay for the entire installation in 7½ years.

● Whether you plan to modernize your steam plant, or build a new one...whether you burn a lot of fuel, or a little...you can cut a *big* percentage from your operating costs by using up-to-date coal equipment.

A consulting engineer can show you how you can cut labor costs to a minimum with automatic coal- and ash-handling equipment...how you can get more steam for every dollar when you burn coal in a modern installation designed to meet your *specific* needs.

Of all fuels, only coal has ample reserves for the future. And to produce this coal, America has the world's most efficient coal industry. That means that coal users, unlike those committed to other fuels, get the advantages of dependable supply and relatively more stable prices—now and for the future!

If you operate a steam plant, you can't afford to ignore these facts!

COAL *in most places is today's lowest cost fuel.*

COAL *resources in America are adequate for all needs—for hundreds of years to come.*

COAL *production in the U. S. A. is highly mechanized and by far the most efficient in the world.*

COAL *prices will therefore remain the most stable of all fuels.*

COAL *is the safest fuel to store and use.*

COAL *is the fuel that industry counts on more and more—for with modern combustion and handling equipment, the inherent advantages of well-prepared coal net even bigger savings.*

BITUMINOUS COAL INSTITUTE

A Department of National Coal Association, Washington, D. C.

FOR HIGH EFFICIENCY FOR LOW COST

YOU CAN COUNT ON COAL!

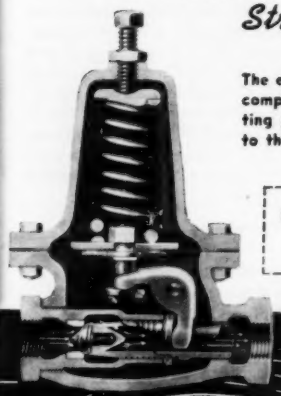
A LONG LIFE and a busy one..

CASH STANDARD Streamlined TYPE 1000 PRESSURE REDUCING VALVE

●Long life, and busy too, because this type "1000" valve does not fail—it's as dependable when production continues at high rate, like today, as when things are normal. Streamliners in thousands of plants these past years—and still serving well prove this. One user wrote, "We could not afford to take chances on time out for job repairs, that is why we used your valve on this job."

No trouble from lack of capacity with this valve! Even under peak load, or sharp changes in demand, the aspirating effect gets the valve wide open for maximum flow. Users know this and will vouch for it.

Write today for Bulletin 1000—eight pages of valuable valve facts.



Streamline Design means

LESS MECHANISM

The elimination of small ports and passages and complicated mechanism with but few close fitting parts gives you more in service and adds to the life of the "1000" valve.

NET RESULT TO YOU

Maximum Capacity When Needed Most • Accurate Pressure Control Under Toughest Working Conditions • Trouble-Free Service • Smooth Operation • Tight Closure • Accurate Regulation • Speedier Production Results • Elimination of Failures • Constant Delivery Pressure • Cost Saving Operation • No Spoilage • Practically Zero in Maintenance Costs.

TURBULENCE ELIMINATED
The streamlined form of the inner valve produces the flow pattern shown here. It is the reason users of the "1000" valve get maximum capacity when it is needed most and accurate pressure control even when production hits non-stop proportions and operating conditions really are tough.

CASH STANDARD CONTROLS.. VALVES

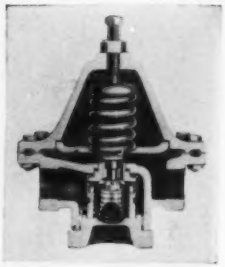
A. W. CASH COMPANY
DECATUR, ILLINOIS

●

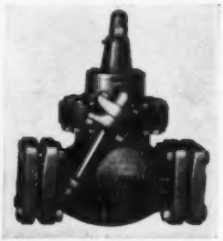
BULLETINS AVAILABLE ON OTHER CASH STANDARD VALVES

Send for them

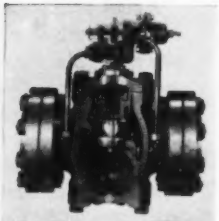
●



Bulletin 950—features the CASH STANDARD Type D Single Seat Pressure Reducing and Regulating Valves for use with most fluids. Shows simple inner working parts that save in maintenance. Diagram explains how valve works. Blueprint shows simplicity of installation.



Bulletin 956—features the CASH STANDARD Type 4030 Back Pressure Valve — designed to automatically maintain a constant pressure in the evaporator corresponding to a constant temperature desired. Shows an Ammonia and Freon Gas Capacity Chart based on ABSOLUTE pressures.



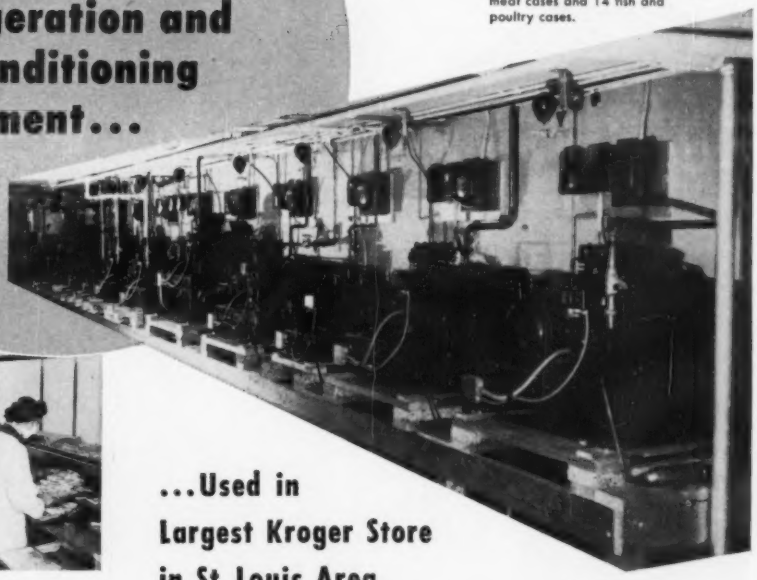
Bulletin 966—features the CASH STANDARD Self-Contained, Pilot Operated Type 10 Pressure Reducing and Regulating Valve for use with water or air; with any gas or oil that is non-corrosive; and with refrigerating fluids such as Ammonia and Freon. Many interesting particulars explained such as: how valve works, tight seating, large capacity, no waste, no water hammer or chatter.

YOUR NAME HERE

Curtis

Refrigeration and Air Conditioning Equipment...

Bank of eleven refrigeration units, ranging from ½ to 3 h.p. used to provide refrigeration for 66 feet of self-service meat cases and 14 fish and poultry cases.

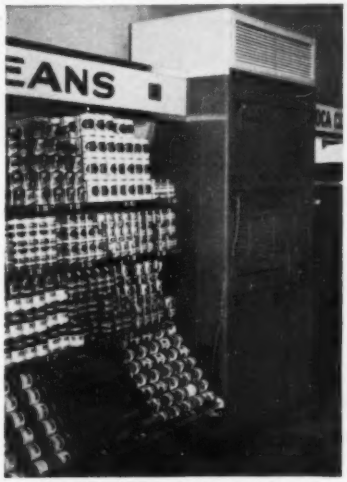


Curtis packaged unit controls temperature and humidity in pre-packaging room.

...Used in Largest Kroger Store in St. Louis Area

Kroger's confidence in Curtis equipment is well-founded. Curtis equipment is built by a company with over 98 years of manufacturing experience.

With the broad Curtis line of Air Conditioning and Refrigeration equipment Curtis Distributors can make this type installation.



One of five 5-ton air conditioning units used in the installation. Note small space used by compact cabinet.

Curtis REFRIGERATING MACHINE DIVISION
of Curtis Manufacturing Company
1950 Kienlen Avenue • St. Louis 20, Missouri

Use Coupon for Complete Information

716

CURTIS REFRIGERATING MACHINE DIVISION
of Curtis Manufacturing Company
1950 Kienlen Avenue • St. Louis 20, Missouri

I am interested in direct factory franchise. Send complete details.

Company Name .....

Street .....

City ..... Zone ..... State .....

Signed .....

MULTI-VENT

T.M. Reg. U.S. Pat. Off.

Low Velocity Air Diffusion CEILING PANELS

in Pittsburgh's

GATEWAY CENTER BUILDINGS

Multi-Vent panels have been specified throughout for diffusing both cooled and heated air in all the interior bays of the first three office buildings, now under construction.

Eggers & Higgins, Architects
Irwin Clavan, Architect
Meyer, Strong & Jones, Consulting Engineers

Selected for . . .

TRULY DRAFTLESS, NOISELESS AIR CONDITIONED COMFORT . . .
for over 8000 office workers, summer and winter.

Plus these great advantages possible only with Multi-Vent...

COMPLETE FREEDOM IN LOCATING MOVABLE PARTITIONS
Partitions may even bisect a diffusing panel without disturbing in any way Multi-Vent's incomparable over-all uniformity of room air movement, temperature, and humidity.

COMPLETE FREEDOM IN LOCATION OF LIGHTING FIXTURES . . .
for Multi-Vent panels are completely concealed in standard acoustical ceilings, and in no way interfere with interior design.

See SWEET's Arch. & Eng. files or write for detailed literature.

RADIANT PANEL HEATING AND COOLING EFFECT ADDS TO THE COMFORT FACTOR
The large areas of the ceiling which function as distribution plates for the Multi-Vent panels are heated or cooled to the temperature of the supply air.

MULTI-VENT DIVISION **THE PYLE-NATIONAL COMPANY**
1373 North Kostner Avenue Chicago 51, Illinois

SEALMASTER *Ball Bearing Units*

With ZONE HARDENING*

ZONE HARDENING is a completely automatic heat treating process by which the inner race ring of SEALMASTER Ball Bearing Units is hardened—through the ball path section only! (See 1 in cutaway view.) The extended part of the inner race is left in its original metallurgically soft tough state. Hardened set screws are mounted through this soft portion of the race (See 2 and 3), permitting race-to-shaft locking with increased holding power and greater resistance to shock and vibration. Firm lock of bearing to shaft minimizes danger of fretting corrosion and eliminates shaft wear.

SEALMASTER first introduced the self-aligning, permanently sealed, industrial ball bearing unit . . . the outer race locking pin . . . the ball retainer riding the inner surface of the outer race ring—and now Zone Hardening—all patented features!

SOME IMPORTANT SEALMASTER FEATURES

PERMANENTLY SEALED, SELF-ALIGNING BALL BEARING
. . . has felt-lined steel flingers rotating in labyrinth to prevent entry of dirt and to retain proper amount of lubricant (see 4).

LOCKING PIN AND PERIMETER DIMPLE
. . . prevents bearing from spinning in its housing and prevents fretting corrosion between housing and bearing, yet permits sufficient shaft alignment without seal distortion (See 5 and 6).

BALL RETAINER
. . . rides on the ground inner surface of the outer race ring (See 7), eliminates ball wear, trapping grease and preventing its churning in the bearing.

SEALMASTER Units are available in many special housings as well as in the complete standard line. Write us for full details on special units. Ask for a copy of SEALMASTER Catalog 845.

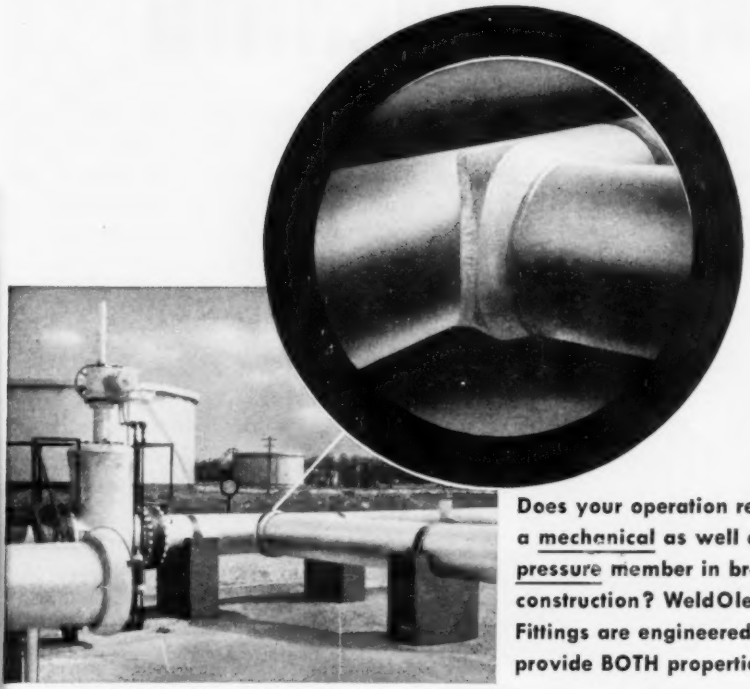
*Patented—exclusively SealMaster's

SEALMASTER BEARINGS
47 RIDGEWAY AVENUE, AURORA, ILLINOIS
A DIVISION OF STEPHENS-ADAMSON MFG. CO.

FACTORY REPRESENTATIVES AND DEALERS IN ALL PRINCIPAL CITIES

ENGINEERED REINFORCEMENT

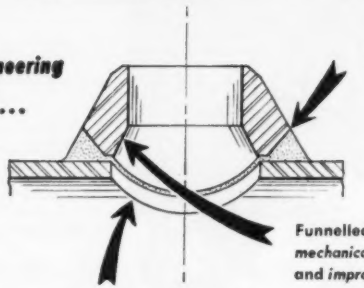
FOR YOUR BRANCH CONNECTIONS



Does your operation require a mechanical as well as a pressure member in branch construction? WeldOlet Welding Fittings are engineered to provide BOTH properties.

A big portion of your engineering job is done for you, if you...

Specify Bonney WeldOlet Welding Fittings to Insure Permanent Strength


Reinforcement where both the mechanical and internal stresses are most severe
Funnelled to relieve mechanical stress concentrations and improve fluid flow
Shaped and beveled for clean, quick and economical installation

FOR COMPLETE ENGINEERING DATA WRITE FOR YOUR BONNEY W3 WELDOLET CATALOG

WELDING FITTINGS DIVISION

BONNEY FORGE & TOOL WORKS

ENG. DEPT., 715 MEADOW STREET

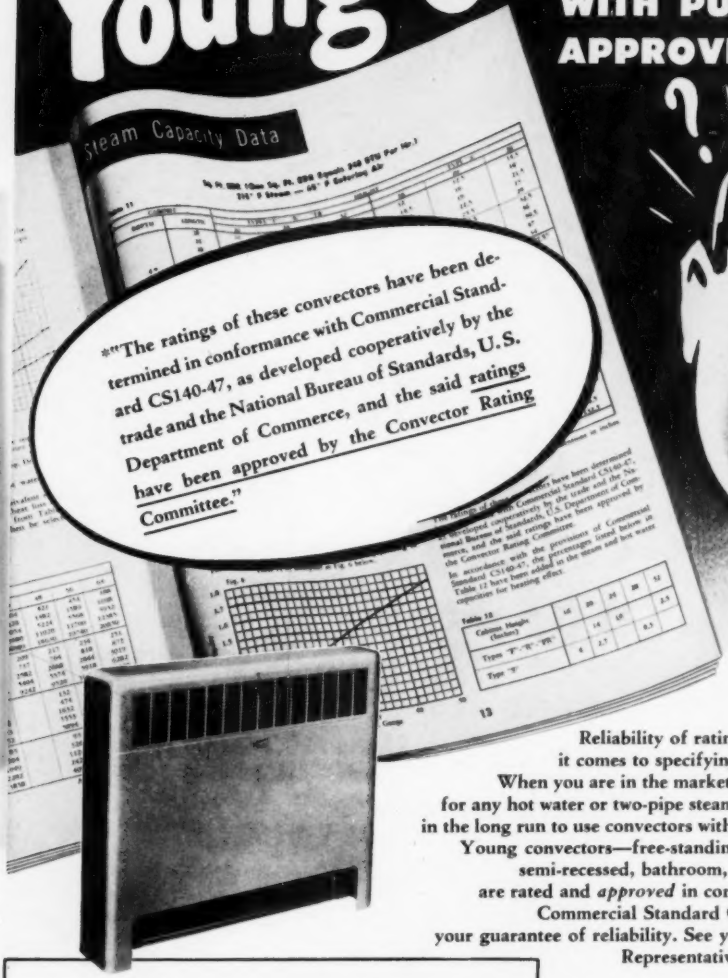
ALLENTOWN, PENNSYLVANIA

BARBER COLMAN
venturi-flo®
CEILING
OUTLETS
A UNI-FLO PRODUCT
ENGINEERED AIR DISTRIBUTION
GUARANTEED PERFORMANCE
BARBER-COLMAN COMPANY
1228 ROCK STREET • ROCKFORD, ILLINOIS

DON'T WORRY!...USE

Young Convectors

WITH PUBLISHED APPROVED* RATINGS


Steam Capacity Data
*"The ratings of these convectors have been determined in conformance with Commercial Standard CS140-47, as developed cooperatively by the trade and the National Bureau of Standards, U.S. Department of Commerce, and the said ratings have been approved by the Convector Rating Committee."

Reliability of ratings is a real boon when it comes to specifying any heating equipment. When you are in the market for convectors—for any hot water or two-pipe steam system—you'll find it pays in the long run to use convectors with *approved ratings*. Young convectors—free-standing, wall-hung, semi-recessed, bathroom, and low-level models—are rated and *approved* in conformance with Commercial Standard CS140-47—your guarantee of reliability. See your nearest Young Representative or write for full details.

1927 · 1952
25 YEARS OF PROGRESS IN HEAT TRANSFER ENGINEERING

YOUNG

Heating, Cooling, Air Conditioning Products for Home and Industry.

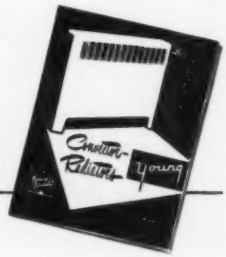
Heat Transfer Products for Automotive and Industrial Applications.

YOUNG RADIATOR COMPANY

Dept. 512-L • RACINE, WISCONSIN

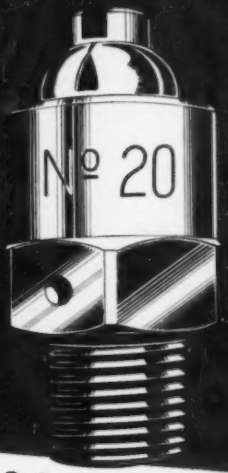
Factories at Racine, Wisconsin and Mattoon, Illinois

If you think all convectors are alike, you'll find Catalogs No. 4049 and 4150 revealing. They give full details, including illustrated features of Young Convectors, approved ratings, dimension data, etc. Be sure to have a copy in your catalog file. It will be sent you without obligation.

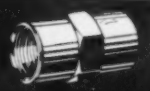


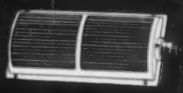
Same Goal

No. 20



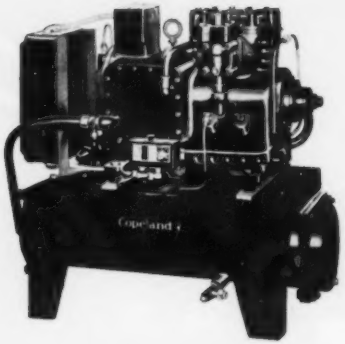
WINNING PERFORMANCE FOR USERS





COPELAMETIC

THE *Accessible* HERMETIC



Cutaway of 7½ H.P. COPELAMETIC Motor-compressor

fits into any air conditioning plan

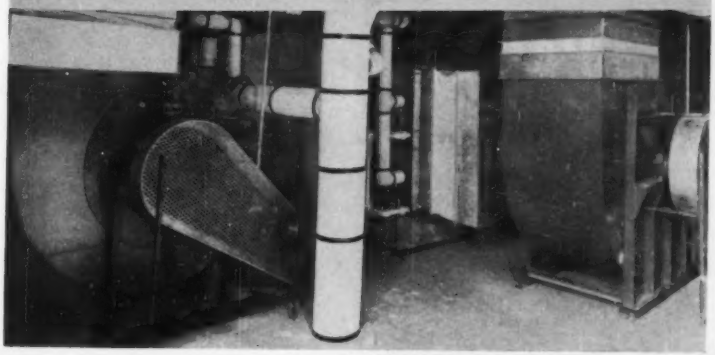
Whether it's a room air conditioner, a large package unit or a huge factory system, COPELAMETIC is your answer to the question "Which refrigeration unit shall I recommend for the air conditioning system?" COPELAMETIC has become the standard of comparison for dependability, ruggedness, compactness and long life. Your clients will appreciate the COPELAMETIC design which eliminates belts, seals and manual oiling . . . reasons for 9 out of 10 service calls. Better yet, they'll appreciate the practical feature of accessibility.

Air-cooled, remote COPELAMETICS are built from ¼ thru 3 HP. There are also water-cooled, remote units from ⅓ thru 7½ HP. Self-contained COPELAMETICS are available for all applications. Write for Condensed Catalog C-52.

REFRIGERATION UNITS
(OPEN TYPE AND COPELAMETIC)
WATER COOLERS

Copeland
DEPENDABLE *Electric* REFRIGERATION

COPELAND REFRIGERATION CORPORATION, SIDNEY, OHIO



Amityville Memorial H. S.
Amityville, L. I., N. Y.

Wm. I. LaFon, II
Architect

Albert Fentzlaff, Inc.
Heating and Ventilating
Engineers

Heating Maintenance Corp.
Heating and Ventilating
Contractors

At left: A view of one of the Equipment rooms, showing some of the General Blowers installed.

GENERAL BLOWERS

Engineered for Quiet Operation

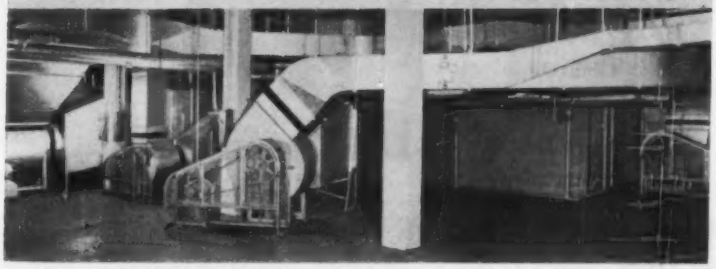
Engineering offices in major cities.

SCHOOL QUIET

Junior High School 14
Brooklyn, N. Y.

Board of Education
City of New York

Jarcho Bros.
Heating and Ventilating
Contractors



At right: A few of the General Blowers installed in the above school. Basement Fan Room.

GENERAL BLOWER CO., 8622 FERRIS AVE. MORTON GROVE, ILL.

Whe... Air Filters . . .

FEEL THE FILTER PACK!

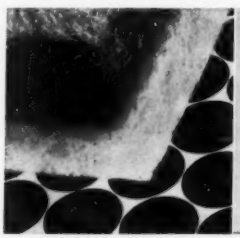
The soft, silky glass fibres are easy on the hands—and really stop Dust! The *magnified* view of the Glasfloss filter pack above shows why the long, fine curly fibres provide efficient filtering action. This fluffy, resilient mass provides an intricate maze of air passages with a greater surface area to catch and hold more dust throughout the entire pack. **RESULT**: Longer life, less changes, lower cost.

Glasfloss DISPOSABLE AIR FILTERS

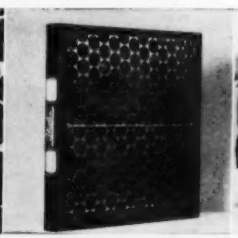
- Hold more dust at higher efficiency
- Less resistance to the passage of air
- Insure greater air capacities
- Easier to handle during installation and removal
- Tough and resilient
- Highly fire resistant
- Moisture-proof

Glasfloss
MAKES A COMPLETE LINE OF DISPOSABLE AIR FILTERS

Descriptive literature on request—
Address Dept. HP-11



GLASFLOSS I-S
for heavy industrial use



GLASFLOSS STANDARD
the all-purpose filter

GLASFLOSS ROLL-PAK
for economical bulk use

Glasfloss 155 EAST 44th STREET, NEW YORK 17, N. Y.

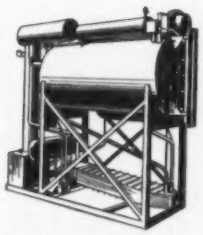
He specified Servel...

the dependable air conditioning equipment

He can rest assured because Servel has a well-deserved reputation for reliability and economy in meeting all air conditioning needs—comfort air conditioning, chilled water for industrial processing, precooling air for industrial applications.

Reliability—Because Servel Air Conditioning has *no moving parts* in the refrigeration system, there is nothing to vibrate or wear. It operates continuously at peak performance without loss of capacity and with minimum maintenance. A five-year factory warranty backs up the dependability of the famous Servel "no moving parts" design.

Economy—The Servel unit operates on steam at atmospheric pressure which can be obtained from any source—waste steam, waste heat or district steam. With simple controls, the Servel unit modulates to meet varying load conditions. Capacity can be reduced to as low as 50% with corresponding savings in steam consumption.



The Servel 25-ton water chiller has low floor loading, no vibration and quiet operation. It can be installed on any floor with most economical piping arrangement.

Investigate the proved advantages of Servel . . . There's a Servel unit or combination that will provide the best *in air conditioning at the lowest operating and upkeep cost. Mail the coupon* today *for full information.*

Servel

the name to watch for great advances in

AIR CONDITIONING ✓ REFRIGERATION

SERVEL, INC., DEPT. HP11, Evansville 20, Indiana

Send me further information about Servel Air Conditioning equipment for:

☐ Comfort air conditioning ☐ Industrial applications

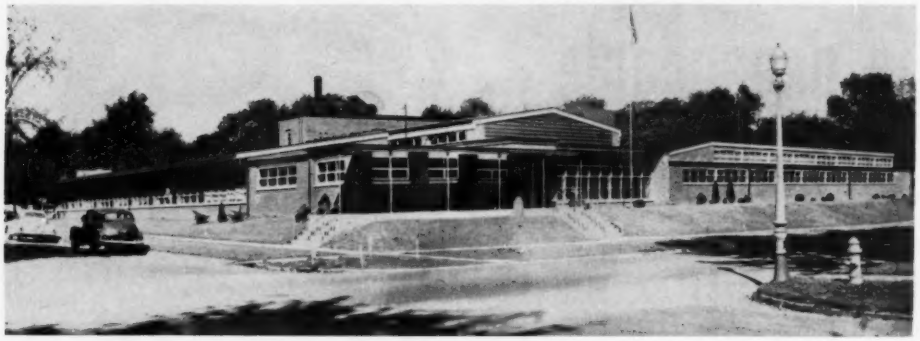
Name_____

Firm_____

Address_____

City_____ Zone____ State_____

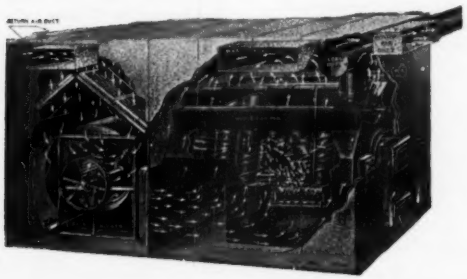
WARM AIR HEATED...
by Campbell



Webster Grade School, Pella, Iowa. Heated with a No. 8250 Campbell combination Gas-Oil Heater. Architects, Smith & Vorhees, Des Moines. Consultant, Wm. E. Nanes, Des Moines. Heating contractor, Backman Sheet Metal Works, Des Moines.

MANY EXTRA ADVANTAGES FOR SCHOOL HEATING

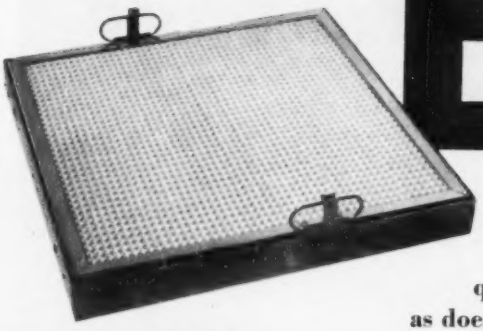
Warm air heating for large, multiple-room structures is both practical and economical when you build your plans around a Campbell 8000 Warm Air Heater. Campbell Units are especially practical for school heating because they provide positive control of temperature, humidity and ventilation, and their ability to deliver quick, abundant heat. Easy to install — available for all fuels in capacities up to 3,000,000 BTUs. Write for complete information.



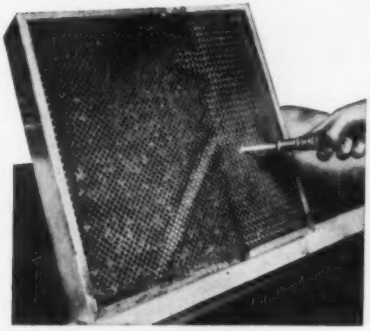
FOR DRYING & PROCESSING operations, we also build direct oil and gas-fired heaters up to 14,000,000 BTUs

CAMPBELL HEATING COMPANY
Des Moines 17, Iowa

EASY

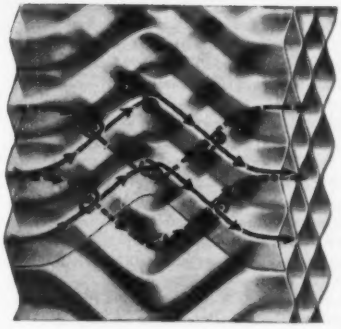


No re-usable filter made cleans so quickly . . . so easily . . . so thoroughly . . . as does the Continental E·Z·Wash Air Filter!



EASY *to wash!*

The Continental E·Z·Wash is the only cleanable air filter which requires no hot water, detergents, or special cleaning tanks. Cold water from a regular garden hose, under normal line pressure, is all that's needed for easy, rapid, and efficient cleaning.



EASY *to oil!*

After cleaning, the Continental E·Z·Wash can be easily, quickly re-oiled. Dip if you prefer. Spray with any commercial, air-operated oil-spray gun.

E·Z· *Wash* AIR FILTERS

save time and labor . . . give you more filtering efficiency for a longer time . . . and cost less in the long-run than disposable filters. Write for full details today!

CONTINENTAL

P. O. BOX 1647 LOUISVILLE 1, KY.

CONTINENTAL AIR FILTERS Inc.

GENTLEMEN: Please send the following:
☐ New Bulletin No. 401-A
☐ Sample of E·Z·Wash Air Filter Media

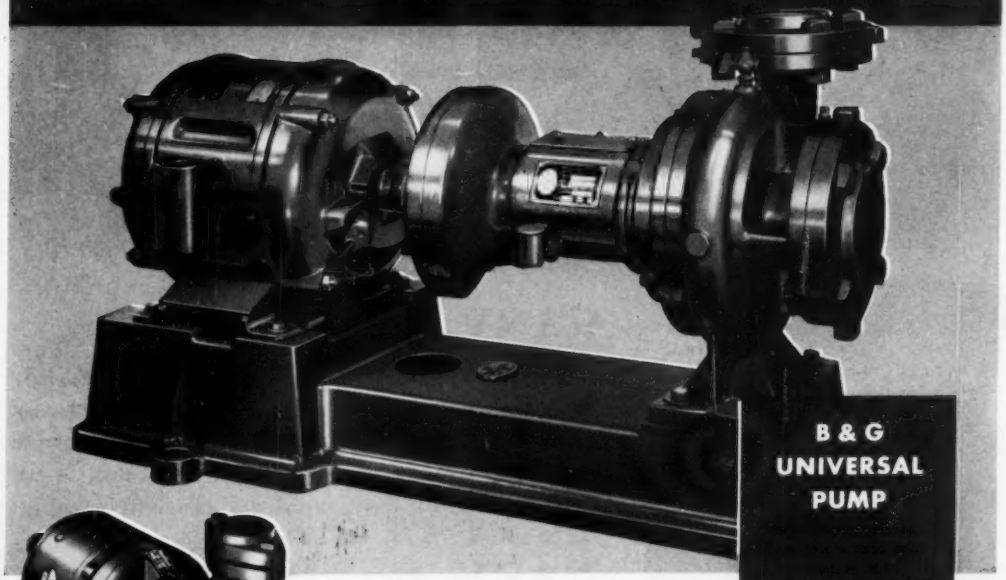
NAME_____

FIRM_____

STREET_____

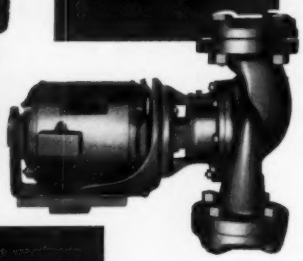
CITY_____ STATE_____

You can do a Better Job



B & G
BOOSTER
PUMP

B & G TYPE
"PD" PUMP



In any B & G *Hydro-Flo* Pump you buy, regardless of size, you will find all the basic features which have made this line of pumps preferred by specifiers and installers of heating equipment.

B & G Boosters and Universals are not just ordinary centrifugal pumps. They are designed and built specifically for heating system application. That's why they are *quiet*—that's why they operate on a minimum of power. B & G Pumps have consistently proved their efficiency and dependability—thousands have been in operation for many years without need for service of any kind.

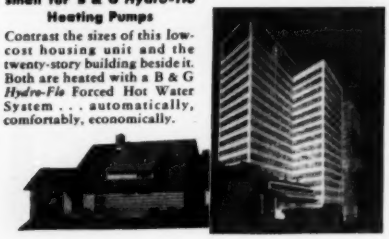
And that's why more B & G Hydro-Flo Pumps are sold than any other built for the same purpose!

Whether you are planning the heating of a cottage, a factory or a wide-spread garden apartment, remember that B & G Pumps are available in sizes closely matched to the pumping requirement.

For full information, send for the B & G Catalog.

No job too big or too small for B & G *Hydro-Flo* Heating Pumps

Contrast the sizes of this low-cost housing unit and the twenty-story building beside it. Both are heated with a B & G *Hydro-Flo* Forced Hot Water System . . . automatically, comfortably, economically.



BELL & GOSSETT
COMPANY
Dept. CS-3, Morton Grove, Ill.

Canadian Licensee: S. A. Armstrong, Ltd., 1400 O'Connor Drive, Toronto, Canada
*Reg. U. S. Pat. Off.

Remember—the trade marks "tt" and "TUBE-TURN" are applicable only to products of TUBE TURNS, INC.

Engineered for extra strength

An important value you get with TUBE-TURN Welding Fittings and Flanges is extra strength . . . at no extra cost.

For example, this TUBE-TURN Welding Tee will withstand more pressure than required by standard codes . . . because it is drawn from seamless tubing to a barrel shape, and because of its generous crotch radius and thickness. Bursting pressures obtained in tests of representative fittings have averaged more than 25% higher than code requirements.

For this extra quality get in touch with your nearby TUBE TURNS' Distributor. You'll find one in every principal city.

Scrappy says: "Aid defense—more scrap today . . . more steel tomorrow."

Write Dept. A-11 for free booklet on Allowable Working Pressures. Use coupon on reverse side.

Be sure you see the double "tt."

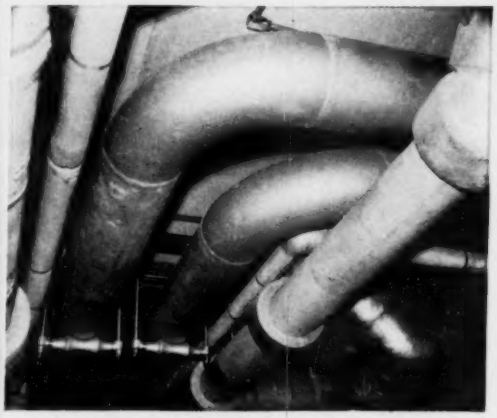
TUBE TURNS, INC. LOUISVILLE 1, KENTUCKY

DISTRICT OFFICES: New York · Philadelphia · Pittsburgh · Chicago · Houston · Tulsa · San Francisco · Los Angeles
TUBE TURNS OF CANADA LIMITED, CHATHAM, ONTARIO . . . A wholly owned subsidiary of TUBE TURNS, INC.

Welded piping system serves New York Stock Exchange

Long the financial capital of the world, the New York Stock Exchange was one of the first commercial buildings to have controlled atmosphere. Recent additions provide efficient, modern air conditioning to keep the financial mart comfortable at all times.

New installations have been made with a minimum of fuss, in limited space, by use of compact welded piping systems. With TUBE-TURN Welding Fittings used to make directional changes, a permanently leakproof system is assured.



Use of welded piping simplified installation in cramped quarters. Welded lines can be fitted closely together, make a neat installation. Welders like to use TUBE-TURN Welding Fittings, because their consistent dimensional accuracy makes line-up easy, particularly important where space is at a premium.

These 10" and 14" lines carry condenser water to the building's cooling tower. Selection of TUBE-TURN Welding Fittings assures optimum flow conditions, and provides a permanently leakproof system.

TUBE TURNS, INC., Dept. A-11
224 East Broadway, Louisville 1, Kentucky

Your name .....

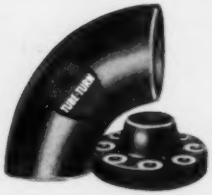
Position .....

Company .....

Nature of business .....

Address .....

City ..... *State* .....



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"tt" and "TUBE-TURN" Reg. U.S. Pat. Off.

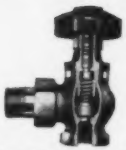
TUBE TURNS, INC.

LOUISVILLE 1, KENTUCKY

An ILLINOIS
Automatic
HEATING SYSTEM

CONTINUOUS FLOW CONTROL
TYPE A

MORRISTOWN (N. J.) MEMORIAL HOSPITAL
JOHN H. & WILSON C. ELY, *Newark, N. J., Architects*
MEYER, STRONG & JONES, *New York City, Mechanical Engineers*
GERHARD HARTMAN, PH. D., *New York City, Hospital Consultant*
AUGUST ARACE & SONS, INC., *Elizabeth, N. J., Heating, Ventilating & Air Conditioning Contractor*



Series 48 Supply Valve

Series G Thermo Trap

Type A Valve

Enthusiastic teamwork and compact planning produced this masterpiece of building economy—a new 236-bed general hospital to serve 5 counties in Northwest New Jersey. It represents the "most beds per dollar" with direct construction costs 20% less than national average.

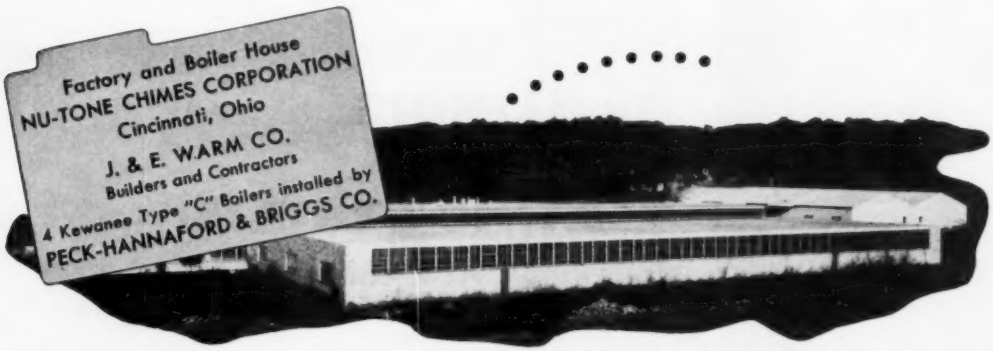
In keeping with this economical planning, a Type A ILLINOIS Control System was selected to represent maximum value. Although higher in first cost, its operation will reflect a sound economy year after year as well as giving the comfort and convenience of automatic heat perfectly controlled.

Three oil-fired boilers generate steam at 105 psig. for the laundry equipment. A 50 psig. system serves the kitchen, sterilizers and autoclaves. Another reduction to 10 psig. handles the air conditioning and ventilating coils, hot water generators and unit heaters. Finally, in three independently controlled zones, steam is reduced by Illinois Continuous Flow Type A valves to pressures varying from 1 lb. to 24 inches (Hg.) vacuum. Outdoor thermostats, in combination with vacuum pump controllers automatically govern the flow and temperature of steam to the standing cast iron radiators, producing a continuous output varied to meet weather demands.

Write for Bulletins

***Representative*, DUDLEY F. PARKER, 480 Broad Street, Newark 2, N. J.**

ILLINOIS ENGINEERING COMPANY
INCORPORATED 1900
RACINE AVENUE AT 21ST STREET • CHICAGO 8


Factory and Boiler House
NU-TONE CHIMES CORPORATION
Cincinnati, Ohio
J. & E. WARM CO.
Builders and Contractors
4 Kewanee Type "C" Boilers installed by
PECK-HANNAFORD & BRIGGS CO.

Modern Factories Need the *EXTRA STEAMABILITY* of

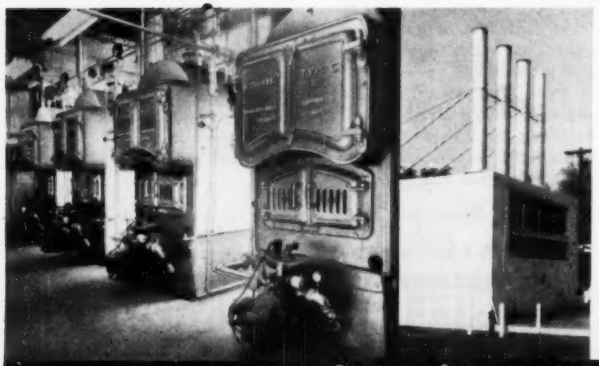
KEWANEE

STEEL BOILERS

The design of modern factory buildings is undergoing a radical change . . . spreading out rather than going up . . . with greatly enlarged roof areas, many skylights and the walls largely windows.

While this modern construction provides better light and a smoother flow of materials through production lines it steps up steam requirements.

With 4 large Kewanees . . . total capacity of 25,000 square feet steam (5 million Btu) . . . the new plant of Nu-Tone Chimes can be sure of plenty of heat all over the building. And the ability of Kewanee Boilers to carry overloads of 50% and more, with high efficiency, provides an ample reserve to handle later plant expansion without additional boiler equipment.

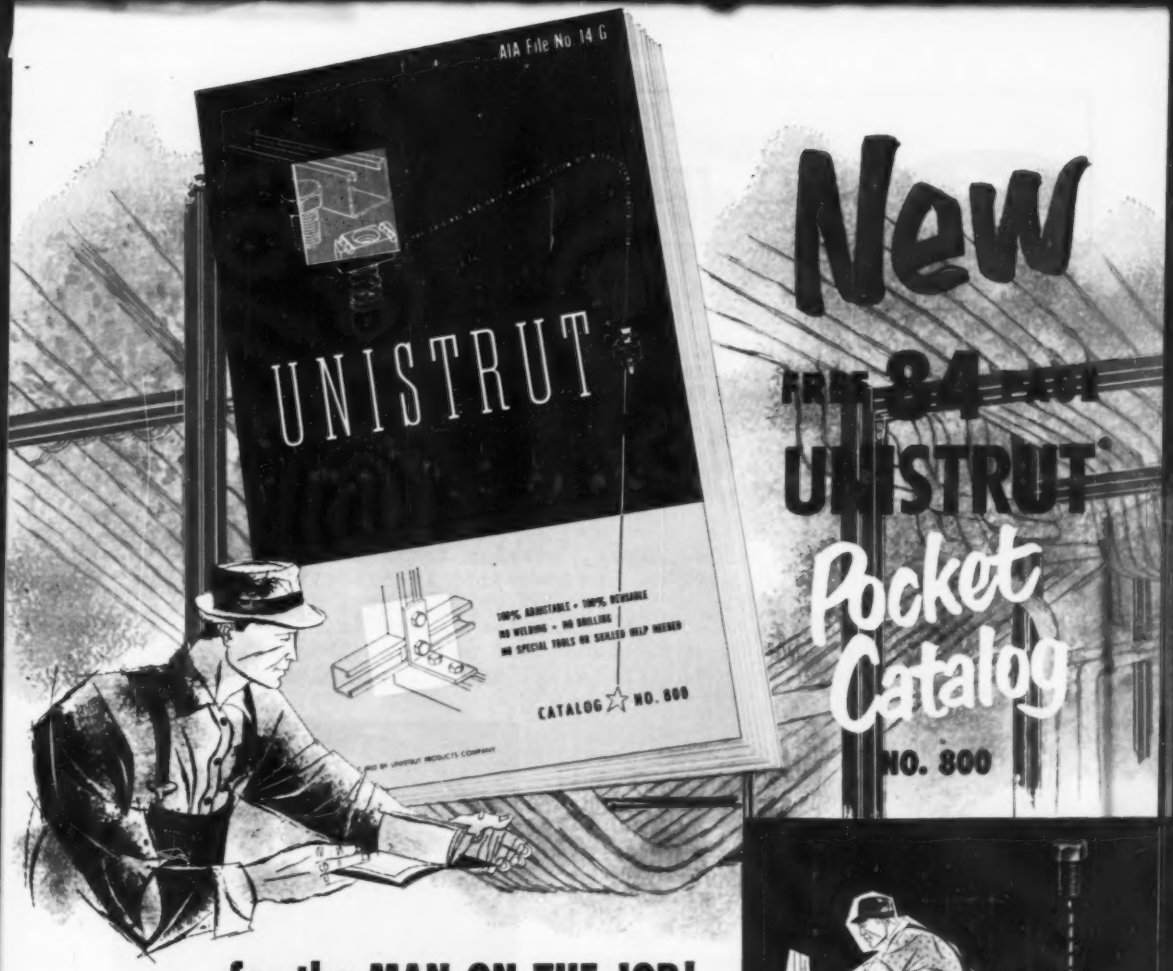


KEWANEE-ROSS PRODUCTS

KEWANEE-ROSS CORPORATION
Division of American Radiator & Standard Sanitary Corporation
KEWANEE, ILLINOIS

Serving home and industry

AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON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100% ADJUSTABLE • 100% REUSABLE
NO WELDING • NO DRILLING
NO SPECIAL TOOLS OR SKILLED HELP NEEDED
CATALOG NO. 800

New

FREE 84 PAGE UNISTRUT Pocket Catalog NO. 800

These are the Basic Components of the UNISTRUT Metal Framing System

for the MAN ON THE JOB!

84 pages crammed with ideas, pictures and data on how to frame, hang, support and mount all kinds of mechanical and electrical equipment with adjustable UNISTRUT All-purpose Metal Framing.

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The UNISTRUT system of mechanical supports provides great strength without bulk. It's easy to work with, lasts indefinitely, and the finished structure assures neat and orderly appearance.

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The World's Most UNISTRUT **Flexible All-Purpose Metal Framing**

Distributors and Warehouse Stocks in Principal Cities—Consult your Telephone Directories

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Please send me a copy of the new UNISTRUT Pocket Catalog No. 800, without obligation.

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Company_____

Address_____

City_____ Zone____ State_____

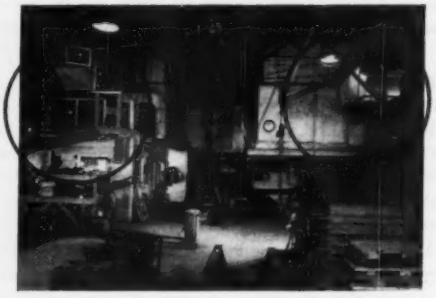
J-C SOLVES another TOUGH HEATING PROBLEM

PROBLEM

Foundry ventilating system uses fans to move air. Absenteeism high due to draughty working conditions. Unpleasant fumes and gases being circulated in working areas.

SOLUTION

J-C engineers called in to redesign foundry heating and ventilating system. Recommended installation of TWO J-C OIL-FIRED SUSPENSION UNITS. Each unit tempers 5,000 CFM of air. Eliminates drafts. Absenteeism sharply cut. Fumes and gases no longer circulated in working areas. Installation highly satisfactory!!



Another example of J-C's ability to solve the tough heating problems faced by heavy industry.

In the installation pictured at the foundry of the Saginaw Bearing Company, Saginaw, Michigan, Jackson & Church engineers were called upon to design a heating and ventilating system providing comfortably heated fresh air to all parts of the working area, at the same time ridding these areas of the fumes and gases present in the melting process.

The problem was solved with the two J-C Suspension units shown. In addition to heating the main foundry melting room, one unit heats an adjacent shipping area. The system has been so designed that during the night uniform temperature is maintained with only one suspension unit in operation through reducing the fresh air from outside.

No matter what your heating or ventilating problem may be, Jackson & Church engineers are at your service to assist with the right solution. There's a Jackson & Church unit to meet most industrial, commercial and residential heating requirements.

. . . America's Largest and Most Complete Warm Air Heating Line . . .

J-C **JACKSON & CHURCH COMPANY, SAGINAW, MICHIGAN**

WORK WELL DONE SINCE '81

TRI-FLEX and AEROVANE REGISTERS

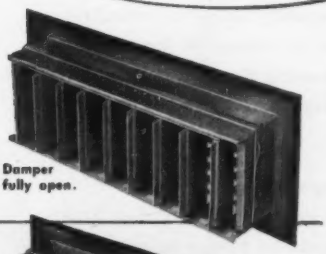
now equipped with

Opposed Blade Dampers

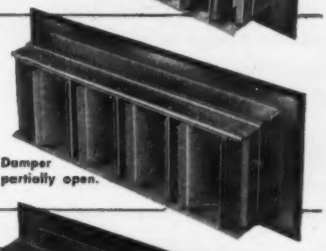
Showing TRI-FLEX T-647 Double Deflection Register with Opposed Blade Damper

KEY OPERATOR FOR OPPOSED BLADE DAMPER

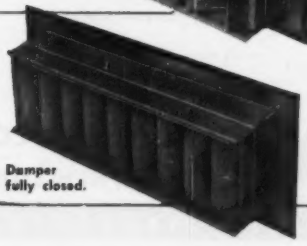
Blades are regulated by key operator which may be removed or tapped permanently into place.



Damper fully open.



Damper partially open.



Damper fully closed.

TRI-FLEX Supply Air Registers and AEROVANE Return Air Registers — specified and installed on important air conditioning jobs — are now constructed with opposed blade dampers.

This improved damper unit insures uniform distribution of air over the entire face of the register . . . and provides positive damper setting in any position from fully open to fully closed regardless of system pressure. Set in a rigid steel frame, blades are formed for extra strength and stiffness, and overlap when closed, eliminating any possibility of air leakage. Blades are regulated through the face of the register by means of a key operator which may be removed or tapped permanently into place.

For complete information and size selection data for TRI-FLEX and AEROVANE Registers and Grilles, write for a copy of Catalog No. 200.

TUTTLE & BAILEY inc

NEW BRITAIN, CONNECTICUT

RIGID KENNEDY INSPECTION

Guarantees Fittings Free of Leaks, Burrs and Scales

KENNEDY MALLEABLE-IRON screwed fittings are made with tough, close-grained iron, tested to 43,000 psi. Carefully controlled annealing prevents splitting or cracking under almost any distortion forces. Uniform hot-dip galvanizing assures a heavy coating that will not chip or flake. Precision machining provides exact alignment . . . speeds installation time.

KENNEDY CAST-IRON screwed and flanged fittings are made with tough, close-grained metal *more than* 50% *stronger* than ordinary gray iron. Precision threading and accurately machined flanges help you get strong, tight joints easily. The complete Kennedy line also includes cast-iron sprinkler and drainage fittings, cast-iron flanges.

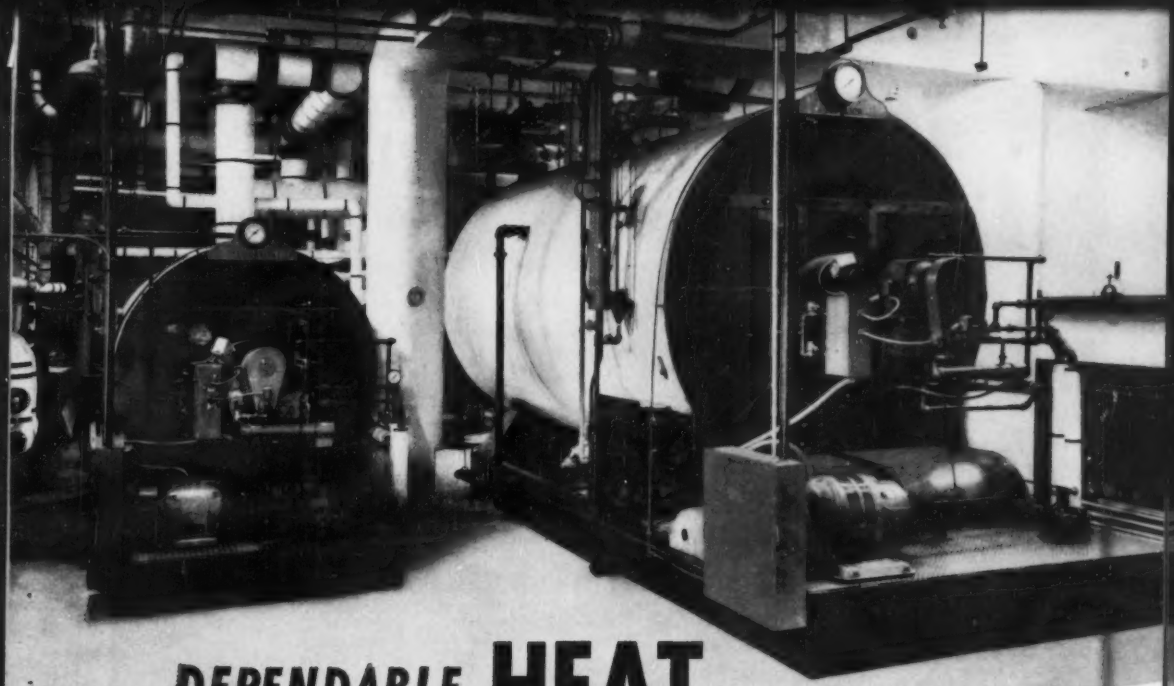
KENNEDY BRONZE fittings with tensile strength of 34,000 psi are individually tested to 100 lbs. air pressure under water to insure freedom from leaks. Available rough or polished in all standard types and sizes.

WRITE FOR BULLETIN 104

KENNEDY INSPECTED FITTINGS

THE KENNEDY VALVE MFG. CO.
ELMIRA, NEW YORK

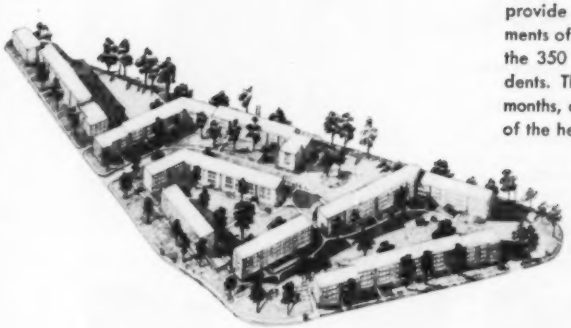
VALVES • PIPE FITTINGS • FIRE HYDRANTS



DEPENDABLE HEAT *for* MULTIPLE HOUSING

These two SUPERIOR STEAM GENERATORS

provide dependable low-cost heat and hot water for 177 apartments of the Brookline, Mass. Housing Authority. Throughout the winter, the 350 h.p. unit supplies both heat and hot water for the 661 residents. The smaller 125 h.p. unit provides hot water in the summer months, and can be used to supplement the 350 h.p. unit at the peak of the heating season.



Requiring minimum space and minimum supervision, while operating at thermal efficiencies guaranteed to exceed 80%, Superior Steam Generators are widely specified by architects and consultants for economical heating in all types of multiple housing, as well as for industrial heating and the generation of steam for process.

Superior Steam Generators are fully automatic; burn oil, gas, or both. 18 sizes from 20 to 600 b.h.p. for pressures up to 250 p.s.i. or for hot water. For complete details, write for Catalog 404.

for performance you can **BANK** *on*

SUPERIOR STEAM GENERATORS

SUPERIOR COMBUSTION INDUSTRIES INC.
TIMES TOWER, TIMES SQUARE, NEW YORK 36, N.Y.

NEW SINAI HOSPITAL

DETROIT, MICHIGAN

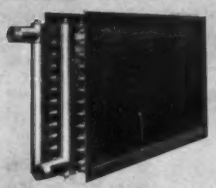
Albert Kahn Associated Architects and Engineers, Inc., Detroit, Michigan

Contractor: J. Brodie & Sons, Inc., Detroit, Michigan

The choice...

KENNARD *Engineered* COOLING COILS

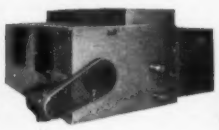
Kennard Chilled Water Coils were selected and approved to meet the exacting conditions so necessary to professional requirements, and to further patient care and comfort.



Typical Chilled Water Coil installed in Sinai Hospital

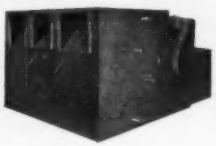
OTHER KENNARD PRODUCTS

AIR CONDITIONING BLOWER UNITS
Horizontal or Vertical

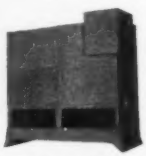


HEATING AND VENTILATING UNITS

EVAPORATIVE CONDENSERS
Indoor-Outdoor to 75 Tons



MULTI-ZONE UNITS



COOLING TOWERS
Up to 75 Tons

KENNARD CORPORATION • 1817 S. HANLEY ROAD ST. LOUIS 17, MO., U.S.A.

Extra-strong, lightweight coils of Bundyweld Tubing are easily mounted onto ceiling. Lying flat and straight, coils are quickly plastered over, with small chance of damage from rough handling or accidental hammer blows.

Get a head start on your competitors— with Bundyweld Ceiling Radiant Heating

Key to Low Cost

Bundyweld is the only tubing double-walled from a single strip, copper-brazed through 360° of wall contact. It's leakproof, thinner walled, yet stronger. It transmits heat quickly, has high bursting strength. It saves on material costs and installation time.

Standard 20′ or 24′ lengths of Bundyweld are easily formed into coils in shop or on job site. Expanded ends (furnished when specified) are quickly soldered into leakproof union. Joined, lightweight coils are easily mounted onto ceiling, quickly plastered over.

You can move right past local competition and stay ahead for years to come—with Bundyweld Ceiling Radiant Heating.

Here's a system that's already a big hit with thousands of enthusiastic users. They've gone on record with praise for this clean, economical and convenient way to heat homes. Just imagine telling your heating prospect that he, too, can have walls without dirt streaks, warmth that's always even, freedom from drafts, lower fuel bills.

That same prospect of yours could well be one of the millions who have already seen Bundy ads in *Better Homes & Gardens* and *American Home*. Those readers have sent in an avalanche of coupons requesting informative literature—and the names of builders and plumbing and heating contractors handling Bundyweld Ceiling Radiant Heating in their communities.

For more details, mail in the coupon below. You'll be glad tomorrow that you did it today!

Radiant Heating Division

BUNDY TUBING COMPANY
Detroit 14, Michigan

SEND FOR FREE LITERATURE!

Bundyweld Ceiling Radiant Heating

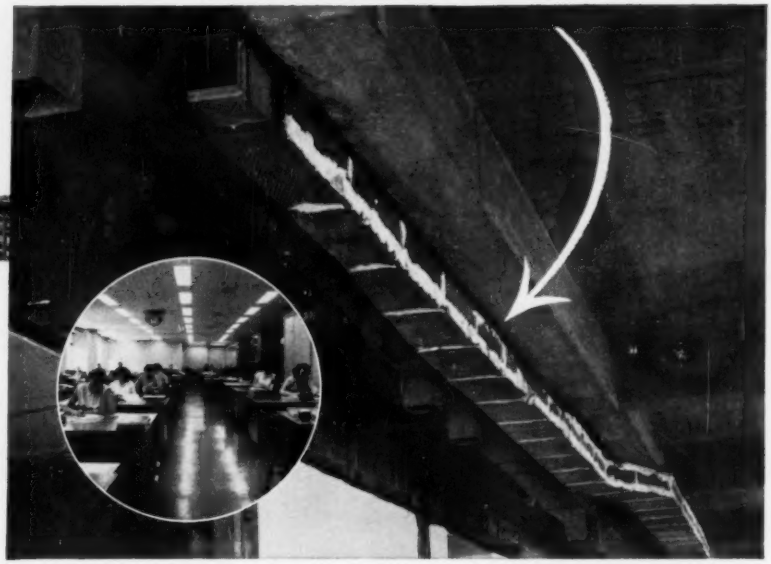
Radiant Heating Division, Dept. HP 1152
Bundy Tubing Company, Detroit 14, Mich.

☐ Send free 20-page nontechnical brochure explaining Bundyweld Ceiling Radiant Heating.
☐ Send Bundy technical radiant heating pamphlet.

Name _____ Title _____
Company _____
Address _____
City _____ Zone ____ State _____

Above: New York City's new Chrysler Building East (foreground) and the original Chrysler Building erected some 20 years ago.

On air-conditioning ducts serving 420,000 sq ft of office space...



Right: Spintex insulation on the air-conditioning ducts serving offices in the Chrysler Building East. Applied by the Asbestos Construction Company, Inc. of New York, an outstanding J-M Insulation Contractor.

CHRYSLER BUILDING EAST SPECIFIES J-M *Spintex* DUCT INSULATION FOR YEAR 'ROUND OFFICE COMFORT

Running through the 32 stories of the new companion structure to the original Chrysler Building are miles of air-conditioning ducts . . . all insulated with Johns-Manville Spintex.

Spintex was chosen because it helps assure the greatest office comfort at the lowest operating cost. It has low thermal conductivity . . . plus resistance to moisture, fire, rot and mold growth. It is one of the most effective insulations for guarding against heat transfer and moisture accumulation.

Johns-Manville flexible, semi-rigid and rigid insulations for air-conditioning ducts meet every industrial requirement. Basically mineral products, each type has its particular characteristics that make it specially suitable for a specific air-conditioning service. All have the low heat transfer properties that are needed for high insulating efficiency.

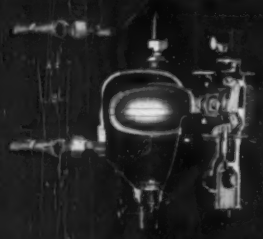
Proper engineering and application are essential to the peak performance of any insulation. J-M Insulation Engineers and J-M Insulation Contractors stand ready to give you a top quality insulation job that will more than pay off your initial investment with maximum fuel savings.

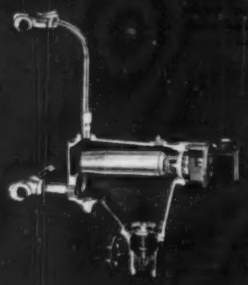
For further information, write for a copy of Brochure IN-135A. Address Johns-Manville, Box 60, New York 16, N. Y. In Canada, 199 Bay St., Toronto 1, Ont.

J-M Insulation applicators applying Spintex on an air-conditioning duct. Thoroughly familiar with J-M insulating materials and application methods, these men have the skill that assures maximum dividends in greater fuel and power savings over the years.

Johns-Manville *FIRST IN* INSULATION

MATERIALS • ENGINEERING • APPLICATION





Are we headed for another shortage?

Will you get the McDonnell products your customers need in the months ahead?

The nearest we can come to answering that is to say you *can* get them from your wholesaler now, and therefore it's simply good business to protect yourself by ordering now, covering all requirements you can anticipate.

Just what lies ahead is anybody's guess, of course, because today's confusion makes accurate forecasting impossible.

However this much is certain: The heavy cuts in material that have now gone into force can cause a real shortage if seasonal demand maintains the pattern already established this year.

That's why we say anticipate your needs. See the customers who will need boiler feeders, or low water cut-offs, or relief valves and put the orders on record with your wholesaler. It may save a lot of trouble and delay later on.

Almost needless to say, the safeguarding of boilers with dependable equipment like that listed here is more vital than ever before. Ask for up-to-the-minute catalog and price data.

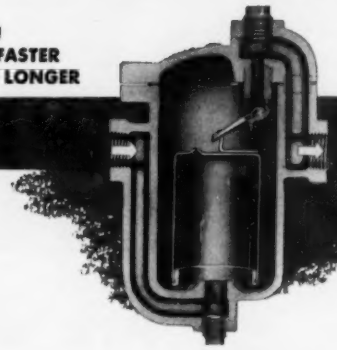
McDONNELL & MILLER, Inc.
3500 N. Spaulding Ave., Chicago 18, Ill.

Doing One Thing Well

McDONNELL

Here's the Trouble-Saving Trap for Low Pressure Vacuum Return Heating

IT GIVES YOU
MORE HEAT, FASTER
—AND LASTS LONGER



"50% REDUCTION IN STEAM TRAP MAINTENANCE since installing Armstrongs on 5 psi system with vacuum return."—John Deere Ottumwa Works, Ottumwa, Iowa.

"HEAT-UP TIME CUT 10%. Only $15.00 annual maintenance on 300 traps on low pressure vacuum return heating system." —John Deere Harvester Works, East Moline, Illinois.

ARMSTRONG inverted bucket steam traps are real *trouble-savers* on low pressure heating systems for these quickly understandable reasons:

1. No Trouble Holding Vacuum — you can't hold return line vacuum with leaky steam traps. Armstrong's *stay* steam-tight — often go for years without repairs. You get a big bonus in steam and fuel savings, too.

2. No Trouble with Corrosion — air and CO_2, particularly in unit heater coils, cause serious corrosion. Every time an Armstrong trap opens there is a momentary pressure drop that "pumps" air down to the trap where it is discharged along with condensate.

3. No Trouble Getting Fast Heat-up — Armstrong traps quickly draw off air that retards heat-up. Where large amounts of air are encountered when steam is turned on, traps with big thermically-operated bucket vents are available with capacity to handle 500 to 1500 cu. ft. of free air per hour.

4. No Trouble Keeping Heating Units HOT — Armstrong traps discharge condensate *at steam temperature* as fast as it accumulates. This keeps heaters packed with hot, dry steam for top BTU output.

5. No Trouble with the Traps — There is nothing to stick, clog, leak or collapse in an Armstrong trap. The hardened chrome steel valves and seats in traps for heating service are identical in design, workmanship and materials to those in Armstrong traps for service at 1500 psig, 900°F. Interior trim is corrosion-resistant 18-8 stainless. No wonder they last so long with so little attention!

Armstrong traps are guaranteed to give you satisfaction or your money will be refunded. They are guaranteed against defects *forever.* Call your local Armstrong Representative for the traps you need now. ARMSTRONG MACHINE WORKS, 874 Maple Street, Three Rivers, Michigan.

SEND FOR THE 36-PAGE STEAM TRAP BOOK FOR COMPLETE DATA

ARMSTRONG STEAM TRAPS

CHECK THESE 3 WAYS YOU CAN SAVE WITH THIS MULTI-PURPOSE INSTRUMENT

Here is the most sensible idea you've ever seen in a recorder or controller—an instrument you can change as your instrument needs change, that you can add to, subtract from, or whose functions you can increase or decrease at little or no expense.

✓ **Save money when you add new functions by adding only those new assemblies needed.**

✓ **Save time-delays by making changes on the job site without returning to factory.**

✓ **Save money on inventory. Parts are interchangeable, fit all Gotham Convertible recorders. You can service a whole group with a minimum stock of basic elements.**

What you can do with the Gotham Convertible

Depending on the chart size of the recorder (6″, 9″ or 12″) you can have a 1-2-3 or 4 pen recorder with 14 pressure, temperature and time operation combinations or a recorder-controller with 38 possible pressure, temperature, and time combinations.

SELF-CONTAINED PORTABLE RECORDER

A portable recorder which has a carrying handle, legs and retaining holder for capillary and bulb. Built from Gotham standard elements, interchangeable with other Gotham instruments. 6", 9" and 12" chart sizes. Mercury, Vapor or Pressure Activated. Spring or electric chart drive. See Catalog 400.

RECORDING PSYCHROMETER

Incorporates the same highly accurate and responsive thermal systems and contains all other Gotham standard convertible features. Wet and dry bulb type. Motor-driven suction fan. 12" chart size. Catalog 400.

RECORDING HYGROMETER

A 2-pen recorder of the wet and dry bulb type. Mercury or Vapor Activated. 9" and 12" chart sizes. Available with variety of wet and dry bulb assemblies depending on application. Catalog 400.

GOTHAM INSTRUMENTS

Keep everything under control with Gotham

GOTHAM INSTRUMENTS
Division of American Machine and Metals, Inc.
Dept. 8, 233 Broadway
New York 12, New York

Please send me a copy of your

- ☐ Catalog 100—Industrial Thermometers
- ☐ Catalog 200—Dial Type Thermometers
- ☐ Catalog 400—Recorders, Psychrometers, Hygrometers
- ☐ Catalog 500—Controllers
- ☐ Have your representative call. No obligation.

Name_____ Title_____

Company_____

Address_____

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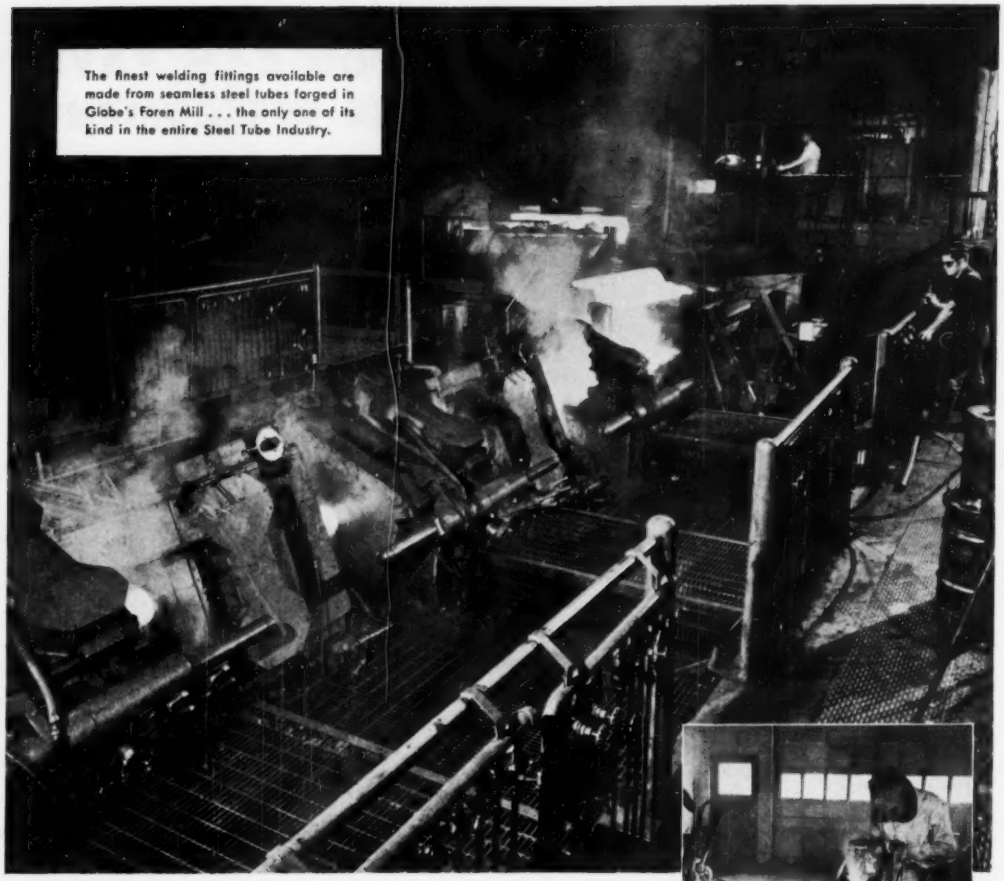

The finest welding fittings available are made from seamless steel tubes forged in Globe's Foren Mill . . . the only one of its kind in the entire Steel Tube Industry.

NOW... get immediate delivery on GLOBE welding fittings...

the only seamless welding fittings precision processed from billet... to tube... to fitting

NOW — you can schedule immediate delivery on the finest welding fittings made today. Globe fittings — the only fittings manufactured through a continuous precision process that begins with the making of the seamless tube and continues through to the production of finished fittings.

The exacting controls employed in this process — plus specialized research, testing and engineering insure uniform high quality and close tolerances. So, for the finest in welding fittings — order now — specify Globe—*and get immediate delivery.*

For complete information on the finest welding fittings available anywhere, send for the Globe Welding Fittings Catalog.

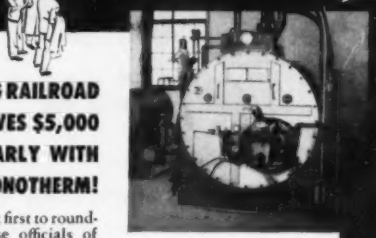
GLOBE STEEL TUBES CO., Milwaukee 46, Wisconsin

Chicago • Cleveland • Detroit • Philadelphia • St. Louis • New York
Denver • Houston • San Francisco • Glendale, Cal.

Producers of Globe seamless stainless steel tubes — Gloweld welded stainless steel tubes — alloy — carbon — seamless steel tubes — Globeiron (high purity ingot iron) seamless tubes — Globe Welding Fittings.

You are cordially invited to take a four-plant tour to inspect "packaged" EconoTherm Installations

. . . see how much OWNERS SAVE on fuel and labor with Dutton BOILERS



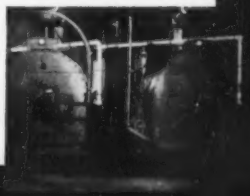
BIG RAILROAD SAVES $5,000 YEARLY WITH ECONOTHERM!

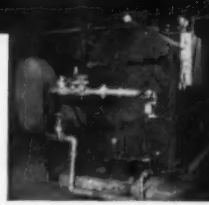
Talk first to roundhouse officials of one of America's greatest railroads*. One Dutton EconoTherm, used for roundhouse heating and hot water supply through *just the colder months each year* has made actual savings pegged at $5,000 per year! Automatically operated, it needs but a few minutes' checking daily. Former equipment required 24-hour-per-day attention.

* Name on request

STOKELY-VAN CAMP, INC., FINE FOOD PACKERS, LIKES ECONO-THERM'S FLEXIBILITY, ECONOMY

At Lakeland, Minn., stop at the sign of Stokely's Finest Foods and World Famous Van-Camp's Pork & Beans. H. H. Young, Chief Engineer, says: "The flexibility of Dutton Boilers fits well into our needs. We have a saving in boiler room labor . . . It is possible to operate with 50% less labor than previously . . . Particularly pleased with service rendered by your representatives."





ECONOTHERM UPKEEP IS ALMOST NIL AT THE CENTURY BRICK CO., MONROE, LA.

J. P. Humble, owner, can show you a gas-fired EconoTherm used around the clock, 5 or 6 days weekly, in curing sand lime brick and new, light building blocks. "In use since 1948 . . . upkeep cost practically nil . . . only shutdowns due to annual inspection or minor repairs of other machinery . . . could not make a more satisfactory purchase than a Dutton EconoTherm."

AT EVANSVILLE, INDIANA, THE WATER WORKS PLANT SUPT. SAYS "WELL PLEASED!"

And there are hundreds of others!

To get more facts first-hand, why not talk to Dutton owners near you? Contact Dutton — or ask your nearby Dutton Representative for the location of installations you can tour yourself! When you write, ask for EconoTherm Bulletin EC-100 G.*

* See Yellow Pages in Phone Book.

CHECK FIRST with Dutton

Dutton BOILERS

DIVISION HAPMAN-DUTTON COMPANY

KALAMAZOO, MICHIGAN • BOILER BUILDERS SINCE 1880

FOUR TYPES — SIZES FROM 5 H.P. UP

A NEW TWIST IN WOLVERINE TRUFIN*

If you seek maximum compactness in a coil designed for heat transfer—that is, if you want to gain a lot of surface area in a very small space—there is no tube that we know of that will provide this advantage better than Wolverine Trufin*.

This is a finned tube that you can bend into an unbelievable radius—and at the same time preserve its original fin-tube contact. As you know, the fins and tube of this remarkable product are made of one piece. The fins are extruded from the wall of the tube during manufacture. Moreover, you can form and fabricate Trufin as easily as you can plain tube.

But its unusual bending facility is not the only advantage it offers. The surface area of any given length of Trufin is much greater than that of plain tube of the same length on a ratio basis. It is not affected by vibration or extreme temperature changes. It represents worthwhile efficiency and economy.

Wolverine Trufin and the Wolverine Spun End Process available in Canada through the Unifin Tube Co., London, Ontario.

Let us send you Trufin Engineering Report No. 4 which gives you much detailed information about this unique finned tube.

*REG. U.S. PAT. OFF.

This double pancake coil (shown above), containing 12 feet of Wolverine Trufin, measures only 9½ inches across its diameter. It is the vital tubular component of an air-cooled condenser.

WOLVERINE TUBE DIVISION
Calumet and Hecla Consolidated Copper Company
INCORPORATED
Manufacturers of tubing exclusively
1419 CENTRAL AVE. • DETROIT 9, MICH.

Wolverine Mill Depots:
DETROIT, MICH. • DECATUR, ALA. • HOUSTON, TEXAS • LOS ANGELES, CALIF.
LONG ISLAND CITY, N. Y. • PHILADELPHIA, PA. • PROVIDENCE, R. I. • ST. LOUIS, MO.

ANOTHER EXAMPLE OF VERSATILITY

DRAVO *Counterflo* HEATERS DO DOUBLE-DUTY FOR FORD MOTOR COMPANY CONSTRUCTION PROJECT

Construction of the new Ford Motor Company Engine Plant in Cleveland called for temporary heating during the winter months of 1950-51 so the building schedule could be maintained. Six Dravo Heaters were installed to serve a two-fold purpose:

COMFORT HEATING—The Dravo Heaters maintained a 40° F. temperature inside a 405,000 sq. ft. area when outside temperatures were 0° F. . . . operated 24 hours per day . . . distributed and recirculated heat throughout the working area with a maximum air throw . . . eliminated the need for salamanders or bonfires to keep workers warm, thereby reducing fire hazards.

PROCESS CURING OF CONCRETE—The Dravo Heaters kept the ground from freezing so concrete could be poured during sub-freezing weather. Heaters helped cure concrete quickly . . . were easily moved to any location to fit job requirements.

DRAVO HEATERS OFFER YOU . . .

LOW INITIAL COST—users report 30% to 60% savings.

EASY INSTALLATION—fuel, electrical and exhaust connections are only requirements . . . no duct work.

LOW FUEL CONSUMPTION—burns gas or oil . . . readily converted . . . direct-fired.

QUICK HEAT—fast warm up . . . heat starts when heater is turned on.

LISTED-APPROVED—listed by Underwriters' Laboratories, Incorporated . . . approved by American Gas Association . . . acceptance by Factory Mutual Engineering Division of Dravo standardized safety control circuit.

AUTOMATIC CONTROLS—on-off or modulating controls.

MOBILITY—can easily be moved to any location to suit requirements.

FLEXIBILITY—can be mounted horizontally or vertically on ceiling, walls or floor.

LONG SERVICE LIFE—stainless steel combustion chamber eliminates refractory lining.

MAIL THIS COUPON FOR MORE INFORMATION . . .

Heating Department, Dravo Corporation
Dravo Building, Fifth and Liberty Avenues
Pittsburgh 22, Penna.

I would like more information about Dravo Counterflo Heaters. Please send me Bulletin No. VW-523-3546.

Name_____

Title_____

Company_____

Address_____

City_____ Zone_____ State_____

DRAVO

CORPORATION

PITTSBURGH • ATLANTA • BOSTON • CHICAGO • CINCINNATI CLEVELAND • DETROIT • NEW YORK • ST. LOUIS • PHILADELPHIA WASHINGTON

Sales Representatives in Principal Cities

Manufactured and sold in Canada by Marine Industries, Ltd., Sorel, Quebec. Export Associates: Lynch, Wilde & Co., Washington 9, D.C.

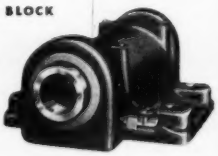
WHEREVER QUIET IS REQUIRED

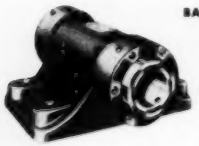
SLEEVOIL PILLOW BLOCK
A precision-built, ring-oiling babbitted bearing, self aligning and exceptionally quiet in operation.

WATER-COOLED SLEEVOIL
Sleevoil Pillow Block, designed for industrial applications where high temperatures are encountered.

DODGE BRONZOIL
Capillary bronze bushing has capacity of one-third its volume in oil. Reservoir with close fitting wick around bushing provides ample lubrication. Both pillow blocks and flange units.

BRONZE BUSHED PILLOW BLOCK
Designed for arrangement No. 2 installations. Two bronze bushings of high lead content mounted in one cast iron housing. Special T-section rings for dependable lubrication.





BALL BEARING PILLOW BLOCK
For anti-friction installations. Two single row, deep groove ball bearings in one cast iron housing. Extended inner races carry the shaft.

CALL THE TRANSMISSIONEER
your local Dodge Distributor, for information about the entire Dodge line of bearings for fan and blower service. Look for his name in the Classified Telephone Directory under "Power Transmission Equipment," or write to the factory.

DODGE BEARINGS *FOR FAN AND BLOWER SERVICE*

FOR INSTALLATIONS in hospitals, auditoriums, office buildings—wherever quiet operation is essential, Dodge offers the perfect answer to the bearing problem. Dodge manufactures a *complete line* of bearings for fan and blower service, all engineered and precision-built for exceptional quietness in operation.

The Dodge line has been developed in close cooperation with the manufacturers of fan and blower equipment, to meet the specialized requirements in this field, efficiently and economically. For complete information on Dodge fan and blower bearings see your Dodge Distributor—or write the factory.

DODGE MANUFACTURING CORPORATION
1600 UNION STREET, MISHAWAKA, INDIANA

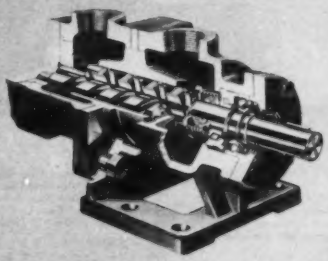
DODGE
of Mishawaka, Ind.

NAME PLATES
FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY,
CHICAGO THRIFT-ETCHING CORPORATION, 1555 SHEFFIELD AVENUE, CHICAGO 22, ILLINOIS

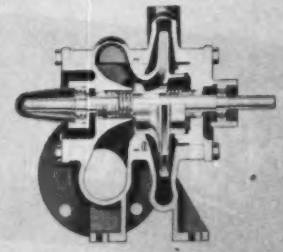
DE LAVAL
STANDARD PRODUCTS

are easy to specify

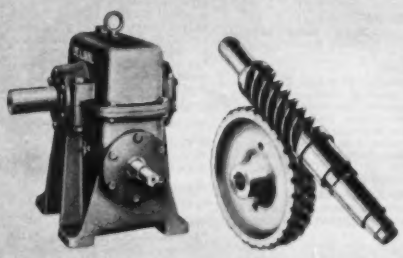
IMO Rotary Pumps



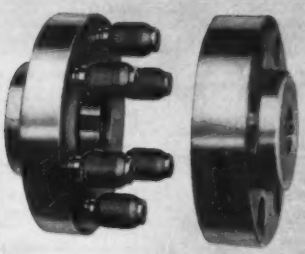
GS Centrifugal Pumps



Worm Gear Speed Reducers and Sets



Crown Couplings



You can save time by selecting the equipment you need from these precision-made De Laval standard products. They are designed to handle a wide range of applications . . . at low cost. Many products are "on the shelf," ready for immediate delivery.

IMO Rotary Pumps—The A313A IMO—for general hydraulic and oil handling services—capacities to 80 gpm—pressures to 150 psi. The A313B—for variety of hydraulic and oil handling services—capacities to 80 gpm—pressures to 275 psi (constant).

GS Centrifugal Pumps—In the GS pumps, mechanical seals eliminate stuffing boxes—permanently lubricated ball bearings eliminate lubrication. Capacities to 400 gpm, heads to 230 feet.

Worm Gear Speed Reducers and Sets — Made in horizontal and vertical, single and double reduction units for ratios to 8000:1 for transmitting up to 250 hp.

Crown Couplings—Unique crowned bolt in De Laval Crown Couplings distributes stresses over a greater area than a straight bolt, resulting in longer life.

DE LAVAL *Standard Products*

Send for your complete set of De Laval easy-selection manuals. Write today.

DE LAVAL STEAM TURBINE COMPANY
805 Nottingham Way, Trenton 2, New Jersey

Fast Motor Service Wherever You Are

"Certified"

Factory approved motor service in every industrial area from 97 Allis-Chalmers Certified Service Shops.

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Greensboro—Southern Elec. Serv. Co.
Rocky Mount—Hammond Elec. Co.

OHIO
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Akron—A-C Supply Co.
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Of course, Allis-Chalmers Certified Service Shops give good service on any electrical equipment, of any make. Tear out this ad and save it, or write the name of the A-C Certified Service Shop nearest you in your address book. Allis-Chalmers, Milwaukee 1, Wisconsin. A-3864

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Sold . . .
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by Allis-Chalmers Authorized Distributors, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

***TEXROPE* — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.**

PUMPS — Integral types from ¾ in. to 72 in. discharge and up.

Would you say NO to efficiency like this?

UNITED NATIONS didn't. Engineers for the fully air conditioned U. N. Secretariat building made Dorex Air Recovery part of the washroom ventilating system. By so doing they avoided having to run two large ducts up through 39 floors to discharge used air at the roof — an important saving in floor space as well as in critical metal.

In operation, Dorex Air Recovery purifies 33,600 cubic feet of washroom air per minute so thoroughly that it can be, and is, re-used in the building's pipe galleries. Since these galleries would have to be conditioned anyway, this represents a worthwhile saving in original equipment.

In another U. N. installation, Dorex Air Recovery removes all odors from the air discharged through kitchen exhaust fans. Thus, though these vents are close to the air conditioning intakes, the conditioned air within the building cannot be contaminated by kitchen odors.

Let us give you more specific information about Dorex Air Recovery — how it works, who uses it, what you can expect it to save you. Just write us for our new bulletin: "How to Manufacture Fresh Air." W. B. Connor Engineering Corporation, Danbury, Connecticut.

W. B. CONNOR ENGINEERING CORPORATION

dorex® air recovery

W. B. CONNOR ENGINEERING CORP.
Dept. A-112 Danbury, Connecticut

Please send me, without obligation, full information on Dorex Air Recovery.

Name.....

Position.....

Company.....

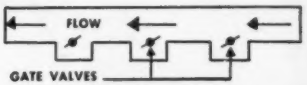
Street.....

City.....Zone.....State.....

CANTON STOKERS *flo-tubes*

WHEN COAL GOES UP THIS WAY . . . LABOR COSTS COME DOWN

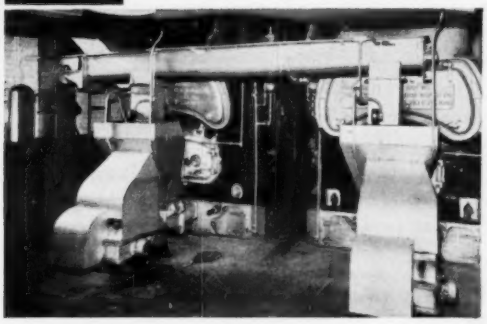
Rising costs, going higher, have speeded up the need for automatic handling of coal —the lowest priced fuel. It will pay to look into the new developments by Canton Stoker, specialists in COAL FIRING, HANDLING, and CONTROL equipment.



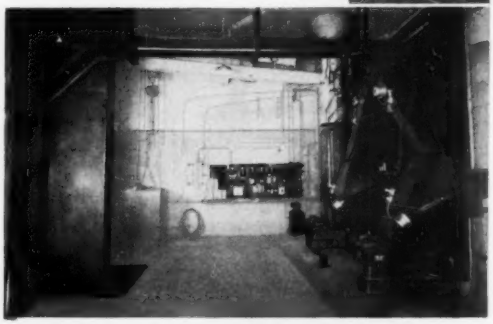
FEEDING THREE OR MORE HOPPERS: The horizontal crossfeed unit is designed to convey coal to a battery of hoppers; receives its fuel by transfer from any type of inclined or vertical Conveyor.

FEEDING ONE OR TWO HOPPERS: This design conveys coal from the coal bin or pile on an inclined plane to feed one hopper or with 'Y' assembly to feed two hoppers.

CANTON "FLO-TUBE" COAL CONVEYOR SET UP ON FACTORY TEST FLOOR BEFORE SHIPMENT, SHOWING APPLICATION TO CANTON STOKERS DESIGNED FOR PACKAGE TYPE WATER TUBE BOILERS. THIS IDEAL INSTALLATION INCLUDED CANTON SYNCHRONIZED COMBUSTION CONTROL, CANTON "TURBO-AIRE" SMOKE CONTROL, TWO CANTON LO-SET RAMFEED STOKERS HOPPER FILLED BY CANTON FLO-TUBE FROM COAL BIN. STARTS AUTOMATICALLY AT LOW COAL LEVEL IN HOPPER . . . FILLS BOTH HOPPERS UNTIL DESIRED HIGH LEVEL IN HOPPERS IS REACHED.



INSTALLATION AT A LARGE BAKERY IN PENNSYLVANIA. CANTON LO-SET RAMFEED STOKERS FOR ANTHRACITE COAL INSTALLED UNDER STEEL FIREBOX POWER BOILERS, INCLUDING BIN-TO-HOPPER COAL CONVEYOR AUTOMATICALLY CONTROLLED, PLUS CANTON COMBUSTION CONTROLS.



THIS EFFICIENT LAYOUT FEATURING CANTON STOKERS AMPLY FULFILLS EVERY HEAT AND POWER DEMAND OF A HUGE FURNITURE WAREHOUSE AND SALESROOM IN MICHIGAN. COAL ELEVATOR AT LEFT, FLO-TUBE DIRECTLY OVERHEAD.

CANTON STOKERS

CANTON STOKER CORPORATION

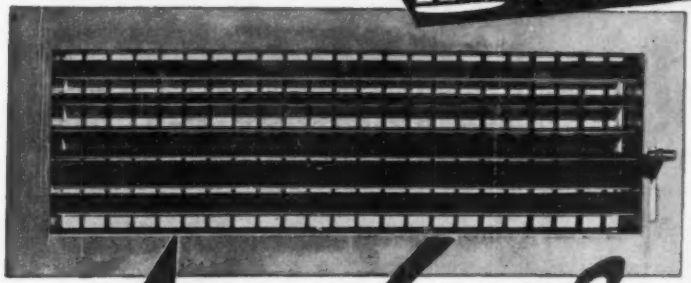
2400 ANDREW PLACE S. W. • CANTON, OHIO

REPRESENTATIVES IN PRINCIPAL CITIES — OR WRITE DIRECT FOR COMPLETE INFORMATION ON: FLO-TUBE SYSTEMS; BINFEED STOKERS; TURBO-AIRE SMOKE CONTROLS AND ALL MODELS OF CANTON STOKERS.

MAKES ANY AIR CONDITIONING SYSTEM A BETTER AIR CONDITIONING SYSTEM

Yet it COSTS LESS.....

● *Illustrated below*—
#276 4-way multi-shutter register
. . . features front louvers and rear damper blades parallel to long dimension . . . second row louvers parallel to short dimension.



Air Foil

4-WAY MULTI-SHUTTER REGISTER

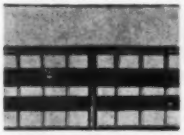
SOLID-SECTION AIRFOIL LOUVER

● Louver knifes air in wind tunnel tests. Turbulence has been almost eliminated giving noiseless control of air.

LEVER CONTROL

● Inconspicuous lever in face of frame controls dampers for complete shut-off.

EXTRA-STRENGTH FRAME . . . . .



● New, exclusive Titus concealed support eliminates unsightly mullions and butted construction.

The smartly designed #276 combines *4-way #270 grille* with the *multi-shutter damper* to assure maximum directional control with positive volume control and shut-off. Damper blades interlock for complete shut-off.

The two front sets of louvers are individually adjustable with blades on ¾ inch centers.

Dampers are controlled from face of grille by inconspicuous lever. Removable lever furnished at no extra cost.

EXTRA STRENGTH—LONGER LIFE

Sound, inspired know-how engineering gives the #276 superb simplicity of design with no unnecessary parts—no clumsy bulk. A special patented, *concealed support* eliminates unsightly mullions and butted construction permitting superior strength with no added weight.

EASY TO INSTALL

#276 grilles are light in weight—easy to carry—easy to fit—easy to put in place. *Save much costly time and labor.*

EXTRA VALUE AT LOWER COST

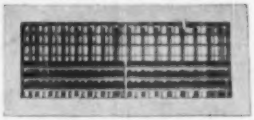
AIRFOIL grilles are priced down to give you more value—more performance—more efficiency—at less cost.

NOTE THESE OUTSTANDING AIRFOIL FEATURES . . .

- Smooth-as-glass AIRFOIL louvers.
- Extra-heavy frames.
- Airtight rubber gasket.
- Positive shut-off.
- Individual louver adjustment.
- Removable lever.

LOOK TO AIRFOIL FOR THE FINEST

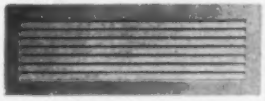
L-270 4-way directional grille for complete control of air stream.



L-274 Double directional grille with multi-shutter damper.

S-8 4-way grille with louvers on ½" spaced front.

RL-21 Return air grille of fixed deflection type with closely spaced louvers.



RL-230 Return air grille incorporates rugged construction and smart design.

AG-25 Volume controller designed to fit behind grille.

CHECK TYPE OF GRILLE ON WHICH INFORMATION IS DESIRED

- ☐ Air conditioning outlets
- ☐ Perforated metal and ornamental grilles
- ☐ Return air grilles and registers
- ☐ Door ventilators
- ☐ Volume controllers
- ☐ Special made-to-order grilles

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____Send complete catalog.
____Send literature on above checked items.

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JENKINS PRACTICAL PIPING LAYOUTS 64

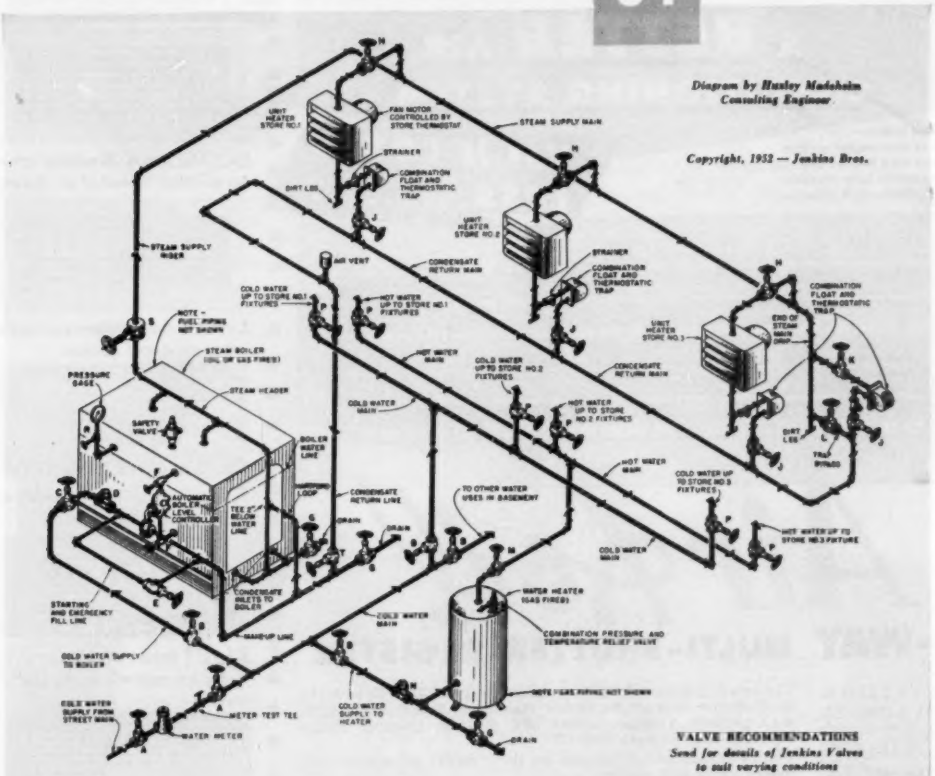


Diagram by Huxley Madeheim
Consulting Engineer
Copyright, 1952 — Jenkins Bros.
UNIT HEATER STORE NO.1
FAN MOTOR CONTROLLED BY STORE THERMOSTAT
STEAM SUPPLY MAIN
STRAINER
COMBINATION FLOAT AND THERMOSTATIC TRAP
DIRT LEG
UNIT HEATER STORE NO.2
STEAM SUPPLY RISER
AIR VENT
CONDENSATE RETURN MAIN
COLD WATER UP TO STORE NO.1 FIXTURES
HOT WATER UP TO STORE NO.1 FIXTURES
NOTE - FUEL PIPING NOT SHOWN
STEAM BOILER (OIL OR GAS FIRED)
PRESSURE GAGE
STEAM HEADER
SAFETY VALVE
HOT WATER MAIN
COLD WATER UP TO STORE NO.2 FIXTURES
HOT WATER UP TO STORE NO.2 FIXTURES
BOILER WATER LINE
COLD WATER MAIN
AUTOMATIC BOILER LEVEL CONTROLLER
CONDENSATE RETURN LINE
TO OTHER WATER USES IN BASEMENT
UNIT HEATER STORE NO.3
END OF STEAM MAIN DRIP
TRAP BYPASS
COLD WATER UP TO STORE NO.3 FIXTURES
HOT WATER UP TO STORE NO.3 FIXTURE
STARTING AND EMERGENCY FILL LINE
CONDENSATE INLETS TO BOILER
MAKE-UP LINE
WATER HEATER (GAS FIRED)
COMBINATION PRESSURE AND TEMPERATURE RELIEF VALVE
COLD WATER SUPPLY TO BOILER
COLD WATER SUPPLY FROM STREET MAIN
METER TEST TEE
WATER METER
COLD WATER SUPPLY TO HEATER
DRAIN

VALVE RECOMMENDATIONS
Send for details of Jenkins Valves to suit varying conditions

Code	Quan.	Jenkins Valve	Service
A	2	Fig. 370 Bronze Gate	Water Service Shutoff
B	4	Fig. 370 Bronze Gate	Distribution Shutoff
C	1	Fig. 106-A Bronze Globe	Water Supply to Boiler
D	1	Fig. 92 Bronze Swing Check	Prevent Boiler Backflow
E	1	Fig. 108-A Bronze Angle	Emergency Boiler Fill
F	2	Fig. 108-A Bronze Angle	Level Controller Shutoff
G	3	Fig. 106-A Bronze Globe	Drains Shutoff
H	3	Fig. 106-A Bronze Globe	Steam Supply to Heaters
J	4	Fig. 370 Bronze Gate	Condensate Drain Shutoffs
K	1	Fig. 106-A Bronze Globe	Steam Main Trap Connection
L	1	Fig. 106-A Bronze Globe	Trap Bypass
M	1	Fig. 47-U Bronze Gate	Hot Water Heater Shutoff
N	1	Fig. 92 Bronze Swing Check	Prevent Water Heater Backflow
P	6	Fig. 370 Bronze Gate	Water Supply Shutoffs
R	1	Fig. 743-G Bronze Needle	Pressure Gage Control
S	1	Fig. 651 I.B.B.M. Gate	Steam Main Shutoff
T	1	Fig. 370 Bronze Gate	Return Shutoff

How to plan PLUMBING AND HEATING IN A SMALL TAXPAYER BUILDING

The one-story "taxpayer" building developed with the movement of shopping centers to suburban areas. Constructed with or without a basement, it houses retail stores, service establishments, amusement centers, restaurants and offices.

Heating and plumbing requirements of such a building are usually provided by the owner, whose main interest is economy and trouble-free operation. An oil or gas fired steam boiler with automatic controls, and a separate gas fired heater for hot water supply, as illustrated, is commonly used.

The two-pipe heating system, located in the basement, utilizes unit heaters hung from the ceiling to save space. Individual thermostatic controls assure fuel savings and even heating. A further refinement of the control system would include an automatic shutoff or modulator valve on the steam line just ahead of each heater, and an aquastat in the condensate return line from each heater. Piping is simple in such an installation and standard-type valves are used.

Consultation with accredited piping engineers and contractors is recommended when planning any major piping installation.

To save time, to simplify planning, to get all the advantages of Jenkins specialized valve engineering experience, select all the valves you need from the complete Jenkins line. It's your best assurance of *lowest cost in the long run.* Jenkins Bros., 100 Park Ave., New York 17.

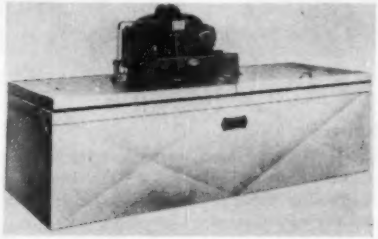
Complete description and enlarged diagram of this layout free on request. Includes additional detailed information. Simply ask for Piping Layout No. 64.

JENKINS VALVES
LOOK FOR THE DIAMOND MARK
SINCE 1864

EQUIPMENT DEVELOPMENTS...

Liquid Chiller

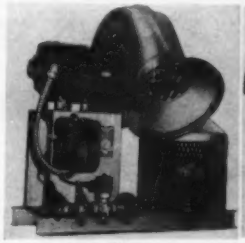
HPAC 1*—Cabinet used as chiller and ice builder. . . . Liquid is chilled by passing through the chiller cabinet or by secondary circulation of chilled water piped from the unit. Each plate in the chiller is individually refrigerated, as well as the front and back walls of the



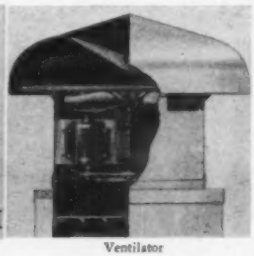
cabinet. Mixing chamber pre-cools the liquid. Liquid travels about 60 ft during the cycle. Quantities of ice are built up in low requirement periods for use during peak load demands. Models range from ¼ to 7½ hp. In addition to industrial uses, applications include air conditioning. [Manufacturer: Brunner Mfg. Co., 1821 Broad St., Utica, N. Y.]

Blower-Type Gas Heater

HPAC 2*—"Homogenator" heater redesigned for improved combustion efficiency, greater safety. . . . Basic model for suspended use and console models for floor and suspended use in 50,000 Btu input and output capacities. Combustion efficiency is obtained by burning gas with induced air draft and a secondary cone over the burner for stabilizing the gas flame. Safety controls include a pilot shut-off valve, limit control and a remote wall-type thermostat. Units may be used with natural, mixed and manufactured gas, butane, propane and LP-gas-air. [Manufacturer: Kilbury Mfg. Co., 14529 Hawthorne Blvd., Lawndale, Calif.]



Heater



Ventilator

Ventilator

HPAC 3—Ventilator which is low in height, for use as either an exhaust fan ventilator or as a fresh air supply unit. . . . It is available with either a direct motor-driven fan or a v belt and pulley drive. Fan sizes range from 12 to 60 in. [Manufacturer: Burt Mfg. Co., Dept. HP, Akron 11.]

Air-Hydraulic Pump

HPAC 4*—Air-hydraulic pumps and power units designed to develop high fluid pressure from low air pressure. . . . Units develop fluid pressure directly from plant air supply. According to the manufacturer, the pumps and power units are suitable for operation of high pressure cylinders, clamps, valves, actuators and hydraulic presses; for safety installation and high pressure testing; for special hydraulic circuits requiring variable and adjustable pressure and volume, and for long pressure-holding cycles with quick approach without overheating or churning the hydraulic fluid. Both units are available in horizontal

For your convenience in obtaining more information about any of this equipment, use this coupon. Add the new products and companies listed here to your Directory Section which you received in your January 1952 Heating, Piping & Air Conditioning, and thus keep your records of sources of supply up to date throughout the year. Single asterisk indicates equipment not listed in Directory Section; double asterisk, equipment and manufacturer not listed.

FOR YOUR CONVENIENCE {11-52}

Heating, Piping & Air Conditioning
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Please ask the manufacturers to send me more information about equipment mentioned under these reference numbers in Equipment Developments and Recent Trade Literature

(Circle each HPAC number in which you are interested)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
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131	132	133	134	135	136	137	138	139	140					

Name _____ Title _____

Company _____

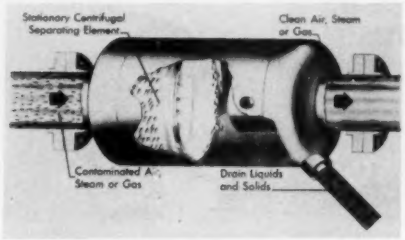
Address _____

City _____ Zone _____ State _____

and vertical construction. [Manufacturer: Ledeen Mfg. Co., 1600 San Pedro St., Los Angeles 15.]

Purifier

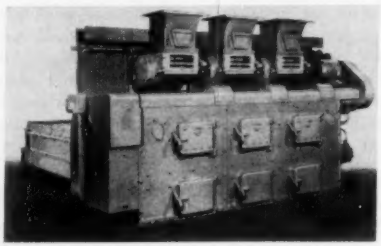
HPAC 5*—Improved and simplified line type "Hi-eF" purifier. . . . Removes dirt, muck and moisture in steam, gas and vapor lines through stationary centrifugal separating element. The entrainment laden vapor entering the purifier is engaged by this element which imparts


Stationary Centrifugal Separating Element
Clean Air, Steam or Gas
Contaminated Air, Steam or Gas
Drain Liquids and Solids

a controlled, rapid rotational motion to the vapor. This action is designed to throw all solids and water outward to the walls of the purifier. It is then ejected out the drain. It is made in all standard sizes up to 24 in. for pressures up to 600 psig. [Manufacturer: V. D. Anderson Co., Purifier Div., 1935 W. 96th St., Cleveland 2.]

Smokeless Stoker

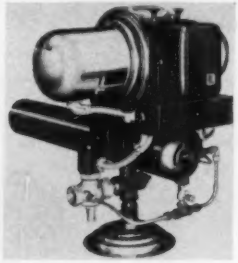
HPAC 6—"Rotostoker" Type CC, small spreader stoker with continuous cleaning feature providing smokeless operation on light loads. . . . Continuous cleaning feature is secured by a reciprocating grate, the alternate sections of which are fixed. Agitation of the fuel bed is provided



keeping it porous and at the same time avoiding any blowholes or dead spots. Furnace turbulence is provided by over fire air and cinder return system. Adaptable for units from 100 rated boiler hp to 75,000 lb of steam per hr. [Manufacturer: Detroit Stoker Co., General Motors Bldg., Detroit 2.]

Oil-Fired Boiler

HPAC 7—Sectional, wet nipple boiler with vertical flues. . . . Type 35 is available in sizes between 240,000 and 560,000 Btu input and is designed for medium size heating installations. The four types of boiler sections are right and left-hand end sections, the regular intermediate sections, and the special intermediate section which is adaptable for a tankless heater. The end sections have a low water leg, providing good water circulation at the hearth level, the manufacturer states. Each end section has two 2 in. flow-tappings to provide versatility of piping and to eliminate air pockets. Tappings for a drain cock are at the bottom of each of the end sections. [Manufacturer: L. J. Mueller Furnace Co., 2005 W. Oklahoma, Milwaukee 15.]



Above: Boiler
Right: Burner

Gas Burners

HPAC 8—"Power-Flame" series gas burners available in eight models from 85,000 to 3,000,000 Btu input. . . . A new method of flame retention is designed to eliminate the possibility of pulsation. One of the safety features of the larger capacity units is a device that permits both pre-purge and post-purge periods to clear the heating plant of fuel both at the time the burner starts and at the close of operations. All controls are burner mounted and factory wired to facilitate installation. [Manufacturer: Siemon Mfg. Co., 1817-19 Holmes St., Kansas City 8, Mo.]

Refrigerants

HPAC 9**—Two new refrigerants and aerosols, Trichloromonofluoromethane and Dichlorodifluoromethane. . . . To be known as "Genetron 11" and "Genetron 12," they are additions to the company's line of organic fluorine compounds. The "Genetron" products comprise a broad range of aliphatic fluorine compounds. Among the present and potential applications are aerosol dispersants, refrigerants, dielectrics, low temperature solvents, plastics and selective solvents. [Manufacturer: General Chemical Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6.]

Temperature and Pressure Relief Valves

HPAC 10*—Series 202 combination valves for guarding against excessive pressure and temperature in hot water tanks and heaters. . . . The valves are the automatic reseating type. Included is a fixture connection (a ¾ in. tapped opening) which permits taking the service water flow directly through the body of the valve. The combination valves are available with standard opening pressure settings of 75, 100 or 125 lb. Pressure relieving capacities are 410,000, 527,000, and 644,000 Btu per hr. Temperature relieving capacities for all valves, regardless of opening pressure, are 725,000 Btu per hr. [Manufacturer: McDonnell & Miller, Inc., 3500 N. Spaulding Ave., Chicago 18, Ill.]

Plastic Fume Ducts

HPAC 11**—Solid plastic corrosion-proof fume ducts, hoods and accessory equipment said to withstand operating temperatures over 200 F. . . . Units are standardized in both round and rectangular duct sections and hood

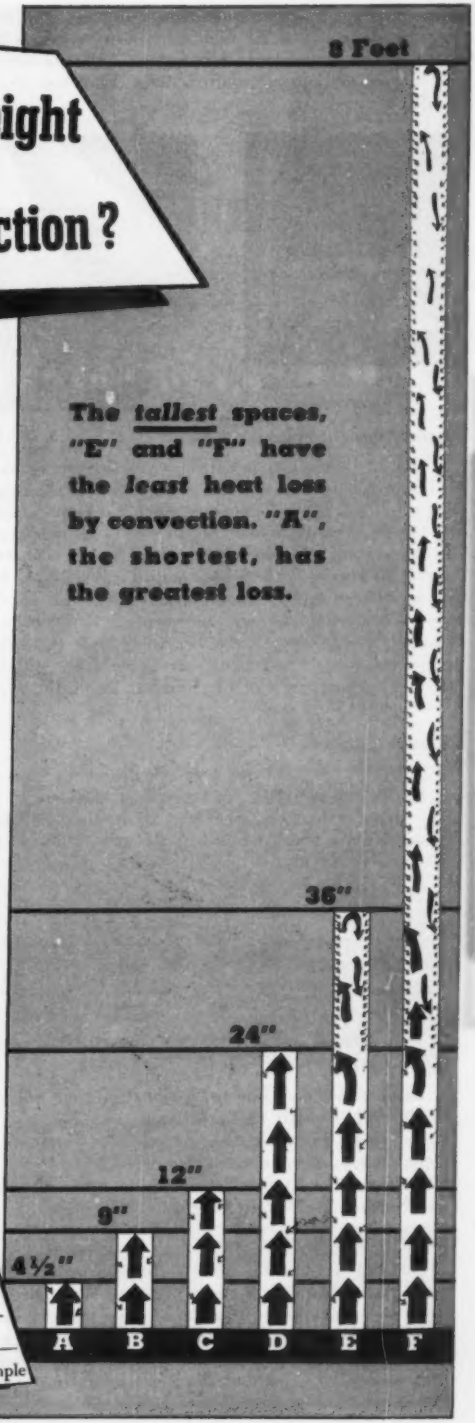
What wall space height has least flue action?

Laboratory tests at Massachusetts Institute of Technology and elsewhere reveal that reducing the HEIGHT of 4" and thinner air spaces below 3 ft., increases the flow of heat and reduces the space's insulation value.

Increasing the height of the wall space increases the amount of surface resistance to convection currents, until at 36" this resistance is greater than the convection. Beyond 36", there is little change.

For this reason, the air spaces in multiple accordion aluminum Infra wall insulation are made to run up and down instead of horizontally. Type 6 Infra insulation in walls has a C factor of .073 and a Resistance of 13.69. Type 4 Infra in walls has a C factor of .107, a Resistance of 9.34. The equivalents in *laboratory-dry* rockwool are 5⅜" and 3¾" respectively.

"Wall Heat Flow," a chapter in "Simplified Physics of Vapor and Thermal Insulation," describes the tests cited above. A copy of this authoritative manual may be obtained free by filling out the coupon below.



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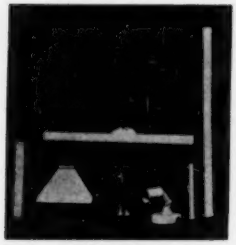
designs. They are manufactured in accordance with the latest recommendations for ventilating open process tanks by the American Standards Association. [Manufacturer: Heil Process Equipment Corp., 12901 Elmwood Ave., Cleveland.]



Above: Ducts

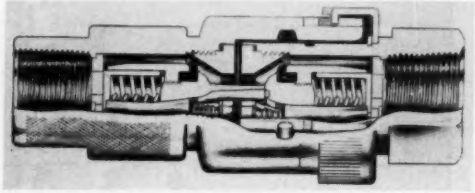
Right: Tubes

Welded Heat Exchanger Tubes

HPAC 12—Welded aluminum heat exchanger tubes made by longitudinally butt welding Alclad 3S-H12 aluminum alloy sheet. . . . The manufacturer states it is both economical and corrosion-resistant. Two standard sizes now available have 1 in. outside diameter with .049 in. and .065 in. wall thicknesses. The tubes have the protective Alclad coating on both the inside and outside surfaces. Tensile strength is 17,000 psi and yield strength is 14,000 psi. Standard lengths are 12, 14, 16, and 20 ft but other lengths between 10 and 24 ft may be ordered. [Manufacturer: Aluminum Co. of America, 801 Gulf Bldg., Pittsburgh 19.]

Valved Coupler

HPAC 13*—A make and break double shut-off valved coupler for use in refrigerated trucks or wherever pneumatic or hydraulic lines are used. . . . As the two halves of the unit are coupled together, the two piston valves open by moving away from their seats. A soft, molded insert forms the seat in each half of the coupler. An "O" ring in socket half provides a seal while coupling is connected. Protector caps are provided for covering coupler halves when disconnected. Available in ½ in. F.P.T. connections. [Manufacturer: Henry Valve Co., 3215 North Ave., Melrose Park, Ill.]



Unit for Zone Control

HPAC 14*—"Zonetrol" unit, designed to automatically open or close the duct dampers of forced warm air heating or air conditioning systems in response to thermostatic temperature control. . . . A number of units may be used to create individually zoned areas, no master zone motor being needed. The unit includes a line voltage motor with a secondary low voltage control circuit incorporated internally. [Manufacturer: Acro Mfg. Co., Crise Controls Div., 2040 E. Main St., Columbus 16, Ohio.]

Steel Tubing for Radiant Heating

HPAC 15—Improved "Therma-Koil" flexible steel tubing for radiant heating systems, which now has a baked, modified phenolic epon type coating, heavily pigmented to give a high density film. . . . This film is highly resistant to abrasion, chemicals and organic substances, the manufacturer states. The tubing is formed from SAE 1008 low carbon steel and is available in two sizes, ½ in. and ⅜ in. ID, both sizes having a wall thickness of 0.035. [Manufacturer: Thermapanels, Inc., 342 Cypress Ave., San Jose, Calif.]

Thin Core Grille

HPAC 16—Thin core, inverted "V" grille for doors and partitions ¼ in. to ¾ in. thick. . . . The manufacturer states that no nails are needed and there are no holes to drill. The grille and auxiliary frame clamp, with two post screws, holding the grille in position. No wood moldings are needed. It is designed to allow 80 percent free area for air passage. [Manufacturer: A-J Mfg. Co., 2119 Washington St., Kansas City 8, Mo.]

Direct Expansion Evaporator

HPAC 17*—CWF shell and tube liquid coolers, direct expansion evaporators for service in refrigeration and air conditioning systems. . . . Evaporator is tested at 300 psi and certified for 150 psi working pressure. The refrigerant velocity is controlled to provide minimum pressure drop with efficient transfer and without oil logging, according to manufacturer. The refrigerant is confined to the removable copper tube bundle and the baffles are furnished in accordance with the water quantities specified. "Freon" is continually agitated to prevent flooding in the bottom or becoming oil saturated. [Manufacturer: Taco Heaters, Inc., 137 South Street, Providence 3.]

Above: Evaporator

Right: Vent Valve

Air Vent Valve

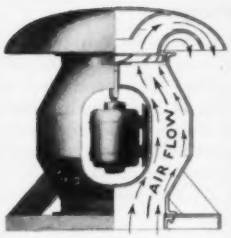
HPAC 18—Automatic air vent valve for hot water heating systems. . . . The No. 5 valve is designed for installation of all types of radiators, baseboards, convectors,

Exit Fumes
FROM NEW INTERCHEMICAL PLANT

12 BIFURCATOR FANS

33 ROOF VENTILATORS

HOW THE BIFURCATOR FAN WORKS



The DeBothezat Bifurcator is a direct motor-driven fan with a divided housing. Corrosive fumes are by-passed around the motor, which is mounted in a separate chamber, open to atmosphere but isolated from exhaust fumes. Bifurcator Roof Ventilators are equipped with weather-proof head and mounting base.

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in broadest selection of

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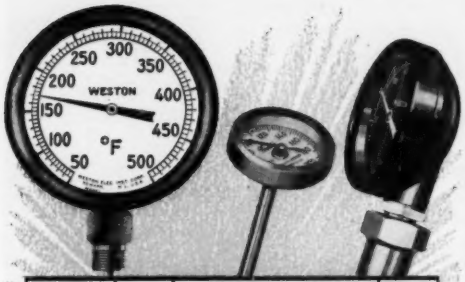

Type	Scale Length	Ranges		Stem Length		% Accuracy of Thermo. Range
		As low as	As high as	As short as	As long as	
Heavy Duty Straight Form	9"	−100F	+1000F	2½"	48"	1
Heavy Duty Angle Form	9 or 12"	−100F	+1000F	2½"	72"	1
Standard Angle Form	6"	−100F	+1000F	2½"	72"	1
General Purpose	4½"	−100F	+1000F	2½"	36"	1
Laboratory	3.40"	−100F	+500F	2"	24"	½ of 1

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WESTON Thermometers give you *all* the advantages of all-metal construction *to an unmatched degree.* The durability of stainless steel stems . . . the readability of large, boldly marked scales . . . the sustained accuracy due to precision manufacture *proved* through the years. Order through your regular jobber, or your local WESTON Representative. Catalog T-13 on request . . . WESTON Electrical Instrument Corporation, 617 Frelinghuysen Ave., Newark 5, New Jersey . . . *manufacturers of Weston and TAGliabue Instruments.*

WESTON

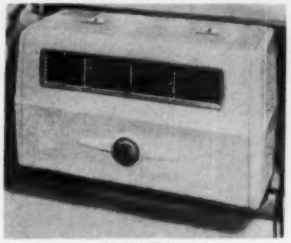
Temperature Instruments INDICATE—RECORD—CONTROL

9288

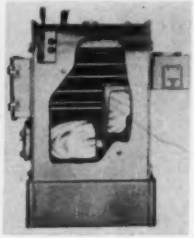
unit heaters and high points of mains for fast venting. Two features of the new valve are expansion washers for more frequent venting cycles and factory fixed setting of expansion washers to give uniform venting. The valve is 1 in. long and 5/8 in. in diameter and may be installed horizontally or vertically. [Manufacturer: H. A. Thrush & Co., Peru, Ind.]

Air Conditioner with Installation Kit

HPAC 19**—Model G3A room air conditioner (1/3 hp), with accessory installation kit. . . . Designed to be installed by the user in 30 minutes, it projects 9 in. into the room and does not extend outside the normal building line. The main weight rests on the window sill. The unit operates on 115 volt, a-c current and serves rooms up to 230 sq ft which are used both night and day. [Manufacturer: Quiet-Heet Mfg. Corp., Quiet Kool Div., 135 N.J. R.R. Ave., Newark 5, N. J.]



Air Conditioner



Boiler

Steel Boiler

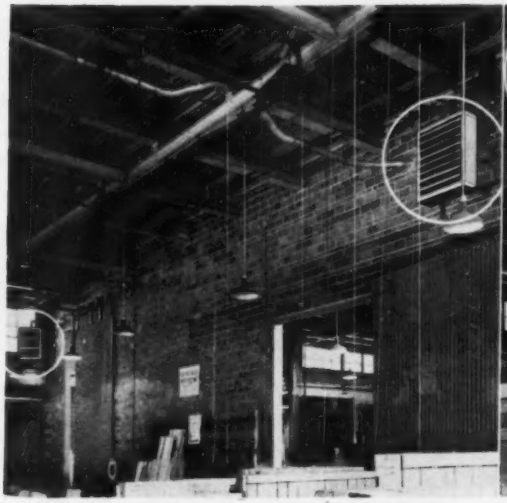
HPAC 20—Improved boiler features relocation of the water line to make it as low as is possible commensurate with rated boiler capacity. . . . "R-Z-U Junior" is compact and can be placed close against a rear wall as the cleanout door for the smoke box is located on the side. Controls are located for "in line" installation near the boiler front. The boiler can be supplied for burning all fuels. [Manufacturer: Fitzgibbons Boiler Co., Inc., 101 Park Ave., New York 17.]

Refrigeration Tube Package

HPAC 21*—Reshipable package for refrigeration tube . . . . "Handigrip Carton" is an octagonal container with a square cut-out in the center. The construction is designed to prevent distortion of the tube by means of eight-point contact instead of four-point contact. It may be laid flat, stacked in horizontal racks or suspended on wall hooks. [Manufacturer: Lewin-Mathes Co., 1111 Chouteau Ave., St. Louis 2.]

Welding Units

HPAC 22—A-c welding units in 300, 400 and 500 ampere capacity. . . . New design incorporates the arc booster circuit. All electrical and mechanical control parts required for connecting or that need maintenance are accessible without removing the case. Reconnection of the input circuit for 220 or 440 volts can be done without replacing any coils. An improved downdraft ventilation system brings air in from the top of the case. A



AIRTHERM Horizontal Discharge Unit Heaters installed on the loading platform of Pittsburgh Plate Glass Company.

AIRTHERM Vertical Discharge Unit Heaters installed in the Pittsburgh Plate Glass Company warehouse.

For "TAILOR MADE" Temperature In Every Department . . .

Airtherm STEAM UNIT HEATERS

Were Chosen for PITTSBURGH PLATE GLASS CO.

ST. LOUIS, MISSOURI

Here's another example of how the complete line of AIRTHERM Steam Unit Heaters can give you truly *flexible heating* to meet the many different requirements in factories, warehouses, garages, super markets, schools, offices, bowling alleys and similar buildings.

Architect:
A. Stanley Knorth & Associates

General Contractor:
Woermann Construction Company

Heating and Air Conditioning Contractor:
Sodemann Heat and Power Company

Consulting Engineers:
Ferris & Hamig

Horizontal Discharge Heaters are built in eleven standard and eleven low outlet temperature models, in capacities from 18,600 BTU to 270,000 BTU.

Vertical Discharge Heaters are built in seven standard and seven low outlet temperature models, in capacities from 32,300 BTU to 350,000 BTU.

Oil or Gas Direct Fired Heaters

Convectors

Centrifugal Fan Type Unit Heaters

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Airtherm MANUFACTURING COMPANY

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This new catalog—just off the presses—contains 36 pages. The catalog provides selection tables, weights, open areas, sizes and prices of the complete Independent Register line of grilles, cold air faces, registers, and ceiling outlets—including new registers for perimeter heating installations.

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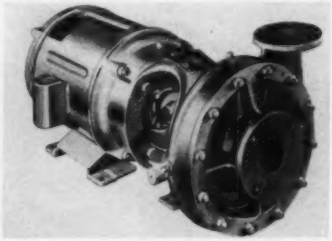
lift bale on top of the case accommodates a standard crane hook. [Manufacturer: The Lincoln Electric Co., 22801 St. Clair Ave., Cleveland 17.]

Mechanical Seal for Pumps

HPAC 23*—"Remite" floating seat, mechanical seal for use in centrifugal pumps. . . . It is designed to eliminate leakage which may occur when conventional packing

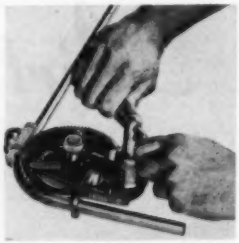


glands are used. The seal is self-lubricating, wear-proof and corrosion-resistant. [Manufacturer: Bell & Gossett Co., Morton Grove, Ill.]

Fastening Gun

HPAC 24**—Hand-held automatic fastening gun for installation of cables and hollow tube lines. . . . The manufacturer states that the stapler will drive bands around cables and tubes into hard or soft woods, plaster walls, flooring, joists, mortar joints and cinder or mineralite building blocks. The gun uses staples of extra-size with leg lengths varying from 3/16 to ½ in. [Manufacturer: Heller Stapler Co., 2153-E Superior Ave., Cleveland 14.]

Fastener



Bender

Tube Bender

HPAC 25—Gear-type tube bender, 270-F, for use with any type of tubing including hard drawn copper and hard temper steel. . . . The bender is constructed so that it can be positioned on the tube at any point where a bend is desired. It can be used to make right or left hand bends, return bends, offset and right angle bends. The benders are designed so that they can be held by hand, clamped in a vise or bolted to a bench. [Manufacturer: The Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago 7.]

Roof Ventilator

HPAC 26*—"Airjet," an automatic fan-powered roof ventilator. . . . Two hinged panels form a weather-tight peak roof. They open automatically when the fan is started and close when it stops. When they are open, the air stream prevents the entry of rain or snow. The ventilator is designed to be especially effective in clearing fumes

[*Continued on page 209*]

LADISH

Controlled Quality

PIPE FITTINGS

maximum service assured by metallurgical soundness

Sound metallurgy . . . the result of unsurpassed facilities and advanced laboratory controls . . . provides the maximum of dependability in Ladish Controlled Quality fittings. Every phase of metal quality . . . composition, structure and physical properties . . . is continuously safeguarded—and certified proof of metallurgical integrity is available to users of Ladish fittings.

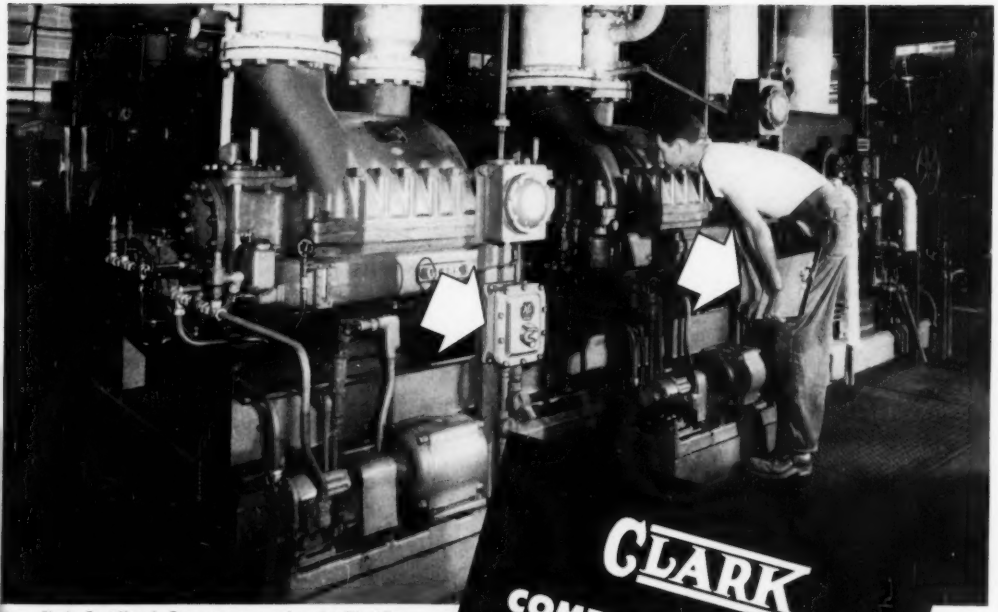
TO MARK PROGRESS

THE COMPLETE *Controlled Quality* FITTINGS LINE
PRODUCED UNDER ONE ROOF . . . ONE RESPONSIBILITY

LADISH CO.

CUDAHY, WISCONSIN
MILWAUKEE SUBURB

District Offices: New York • Buffalo • Pittsburgh • Philadelphia • Cleveland • Chicago • St. Paul
St. Louis • Atlanta • Houston • Tulsa • Los Angeles • San Francisco • Havana • Mexico City • Brantford, Ont.



Two Clark Centrifugal Compressors, equipped with Allen-Bradley Solenoid Starters, in NEMA Type 7 enclosures, installed in Sun Oil Company's refinery at Marcus Hook, Pa.

CLARK

COMPRESSOR UNITS

equipped with

ALLEN-BRADLEY TROUBLE FREE MOTOR CONTROLS

A-B

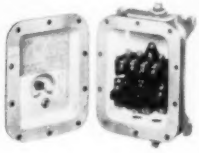
Quality

A-B Bulletin 709 Solenoid Starter

Size 1 Starter with cover removed. Dependable overload relays. White interiors. Easy to wire. Bonderized undercoat for long enclosure life.

Enclosure for Hazardous Gas Locations

Bulletin 709 Solenoid Starter in a NEMA Type 7 enclosure for hazardous gas locations. Note the wide machined flanges.



Why are Allen-Bradley starters so popular for refrigeration and air-conditioning service? . . . Because they do not require regular attention; they are trouble free. Only ONE moving part. No pivots, pins, or bearings to corrode or stick . . . no jumpers to break. You install them . . . and forget them!

No contact maintenance . . . Allen-Bradley cadmium silver alloy contacts never need cleaning, filing, or dressing.

Dependable overload relays . . . Allen-Bradley thermal relays are dependable and remain accurate in their operation, even after long service.

The Allen-Bradley trademark stands for millions of trouble free operations.

Allen-Bradley Co., 1335 S. First St., Milwaukee 4, Wis.

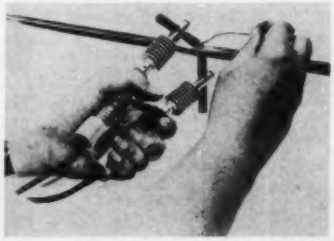
ALLEN-BRADLEY SOLENOID MOTOR CONTROLS

[Continued from page 206]

and heat from above furnaces, foundry pouring floors, vats and other industrial equipment. [Manufacturer: Hartzell Propeller Fan Co., P.O. Box 909, Roosevelt Ave., Piqua, Ohio.]

Accessory for Soldering Unit

HPAC 27**—"Pliers Handpiece," new accessory for the "Glo-Melt" resistance soldering unit. . . . The manufacturer states that by eliminating the need for a separate ground connection to the article to be soldered, the new device



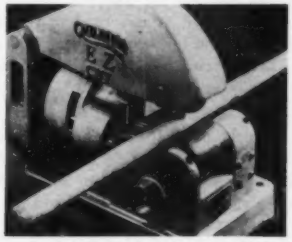
provides for greater convenience in soft soldering through the resistance principle. The unit holds two carbon tips and two wires which provide the heat for making soldered joints. [Manufacturer: Wasserlein Mfg. Co., Inc., 126 W. Cass St., Joliet, Ill.]

Fiber Glass Air Filter

HPAC 28**—Air filter composed of long thin glass fibers. . . . "Filt-R-Ite," is designed to offer a minimum resistance to air flow and provide a large surface area for dust catching due to the thousands of small round glass fibers. The manufacturer states that there is no face loading, unloading or glass splinters. [Manufacturer: Himelblau Assoc., Inc., 5401 W. Harrison St., Chicago 44.]

Pipe Cutter

HPAC 29—"E-Z Cutter", portable pipe, tube and conduit cutter. . . . Power driven rollers revolve around the pipe so that cutting is continuous and slippage is eliminated. The cutter will handle pipe from ⅜ in. to 2 in. and tubing from ⅝ in. to 3 in. Adjustable roller type pipe supports



allow any length and size of pipe to be cut without changing the supports. A foot control leaves the operator's hands free to handle the work. [Manufacturer: Quijada Tool Div., Gaines-Collins, 5474 Alhambra Ave., Los Angeles 32.]

Utility Fan on Wheels

HPAC 30—Fan designed for use where location must be changed frequently. . . . Mounted on a handled steel

NEW Oil Boiler
for added business

Casting for intermediate boiler section. Staggered turbulator fins in vertical flue ways swirl rising flue gases for faster, more efficient heat transfer.

Mueller Climatrol

with Outstanding Design Features

- Wide size range for steam, hot water, and hot water supply — inputs of 240,000 Btu to 560,000 Btu. Staggered fins in flue ways turbulate rising gases for greater heat transfer.
- Precision - machined nipple ports and gas-tight vertical flue passages.
- Modern, attractive styling. Easily cleaned from the top without removing casing. Enclosed controls. Casing can be assembled to boiler after boiler is installed and piped.
- Triple tested. Assembled at factory for hydrostatic testing at high pressure and for correct fit. Knocked down for shipment. Conforms to A.S.M.E. code.
- Equipped with Mueller's efficient oil burner which provides efficient combustion, trouble-free operation. A sturdy burner —quiet, vibrationless.

Here it is — an oil-fired boiler with the same superb quality, easy installation features, and money-saving efficiency as the Mueller Climatrol gas-fired boilers.

It's the new Type 35 for steam or hot water; heavy cast iron, sectional, wet nipple boiler — available with tankless heater or can be used for direct hot water supply.

The Type 35 is in a special size range for those larger residential jobs, apartments, small factories, stores — in fact any installation requiring from 240,000 to 560,000 Btu input.

Because the Type 35 is easily converted to gas, it is a perfect answer for areas where people want gas but gas is not now available. Because it is shipped "knocked down", it is easy to get in any basement. Because it has been assembled and "triple tested", you are sure of a low cost installation and long life satisfaction.

Get complete details on the new Mueller oil boiler now. Use the Type 35 on your next job—convince yourself that the Type 35 is a better boiler.

Mail Coupon Today! E-87

Get the whole story

95th Anniversary

L. J. Mueller Furnace Company
2023-P W. Oklahoma Avenue, Milwaukee 15, Wis.
Send me facts and figures — including complete specifications — on your new Type 35 oil-fired boiler.
NAME.....
COMPANY.....
ADDRESS.....
CITY.....STATE.....

FOR GAS + FOR OIL + FOR COAL

CALL YOUR *Ramset* DEALER FOR "on-the-job" SERVICE

That's because he is skilled in adapting RAMSET tools, fasteners and other products into an integrated service to meet the specific requirements of the work. He is no "long-distance, white-collar operator" —but will put on his working clothes and show your men, right on the job, how to apply RAMSET SYSTEM to save you time and money.

Behind him, he has a highly skilled and long-experienced headquarters staff that will help him on especially unusual or difficult jobs. Someway or other, whether it's a big project or a little one, he will give you a practical answer that will show you how to save time and money with RAMSET FASTENING SYSTEM. Call him any time, without the slightest obligation.

Tru-Set Fasteners matched to the job

Guided by the exclusive Red-Tip Pilot, RAMSET Tru-Set Fasteners go straight to the work, accurately, tightly, permanently. With 54 sizes of drive pins, external and internal threaded studs available, you can select a Tru-Set Fastener closely matched to almost any job, and be assured of prompt delivery from your dealer.

See the new JOBMASTER

Latest RAMSET development, with 10-Star Values that bring new ease, speed, economy and utility. Light, compact, one-piece tool is easy to use, can work in tight corners or otherwise inaccessible locations. Ask your dealer for demonstration and proof of its moneysaving advantages.

Ramset Fasteners, INC.

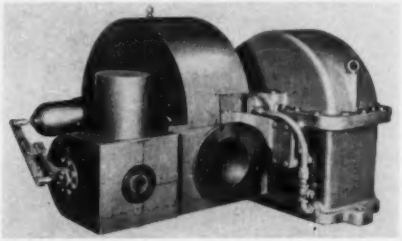
Ramset Division, Olin Industries, Inc.
12117 BEREA RD. • CLEVELAND 11, OHIO

DON'T HAND SET...
Ramset WITH TRU-SET FASTENERS

rod framework equipped with 15 in. metal wheels, the fan can be turned vertically in a complete circle on its mounting and locked in any position. Applications include kiln cooling, blasting hot spots, etc. The fan is available in 24 in., 32 in. and 36 in. sizes. [Manufacturer: Hartzell Propeller Fan Co., Piqua, Ohio.]

Reduction Gears

HPAC 31*—High speed reduction gears for mechanical drive turbines. . . . Available in built-in or coupled designs, the gears have precision hobbed double helical gears, liner-type sleeve bearings, special Kingsbury-type



shaft seals and self-contained forced feed lubrication system. The new line of gears is offered in gear ratios up to 5:1 for built-in units and up to 8.5:1 for the coupled design. [Manufacturer: Elliott Co., Jeannette, Pa.]

EQUIPMENT BRIEFS

"Perforated Fiberok" non-metallic *ACOUSTICAL MATERIAL*. . . . Similar to laminated plastics or vulcanized fiber, it is available in a wide range of perforating patterns both on square and staggered centers. Gages run from 0.010 in. to 0.125 in., in steps of 0.010. The material may be stapled, nailed, glued, screwed or cut with a scissors. [Manufacturer: Pearson Industries, 4554 N. Broadway, Chicago 40.]

VARI-SET MIXER changes heating loads on combustion equipment. A built-in, adjustable orifice eliminates replaceable jets and changes volume of automatically proportioned gas and air for any Btu output within the capacity of various sized mixers used in furnaces, ovens, kilns and other combustion equipment. [Manufacturer: Eclipse Fuel Engineering Co., 1002 Buchanan St., Rockford, Ill.]

Two new models of *GASFLUXERS*. Model 68, designed primarily for use with city gas, has ½ in. orifices and a 3-valve by-pass to regulate the amount of flux that is delivered to the flame. Model SFH has a capacity for fluxing 100 to 120 cu ft of fuel gas per hr. [Manufacturer: Gasflux Co., Mansfield, Ohio.]

OYLTITE provides a sealer to stop leaks in oil pipes, tanks and containers or around leaky joints. Made in stick form, it can be applied while oil is running through the pipes or when it is present in tanks. It is designed to withstand vibrations and changes in temperatures. [Manufacturer: Lake Chemical Co., Dept. OS, 3050 W. Carroll Ave., Chicago 12.]

SEE NEW *Ideas... Products... Methods... Trends*

in

HEATING
VENTILATING
AIR CONDITIONING

MARK THIS DATE NOW

JAN. 26-30

For 5 full days, Chicago's huge International Amphitheatre will be bulging with ideas and up-to-the-minute, cost-saving information on HEATING, VENTILATING, and AIR CONDITIONING.

More than 300 exhibits will display the latest methods, equipment, and parts developed for conditioning air in all types of buildings and plants — public, institutional, commercial, industrial, and residential. Architects, contractors, distributors; consulting, design, and operating engineers, all will have an exceptional opportunity to discuss plans, problems and requirements with the technical experts who will be staffing the exhibits . . will come away with more practical dollars-and-cents ideas than could possibly be acquired anywhere else in so little time.

ATTEND AND BENEFIT

from this 5 day exposition of ideas and progress
Auspices of the American Society of Heating and Ventilating Engineers
Management International Exposition Company

Heating?

Cooling?

Air Conditioning?

Process?

Here's How to Get the RIGHT Answer to your HEAT-EXCHANGE PROBLEMS

The right ratio of surfaces – the right materials – the right velocities – the right proportion between coil area and depth . . . there are dozens of factors that affect the efficiency, maintenance and service life of heat-exchange coils.

For best performance in your own application, the practical approach is to take full advantage of the unequalled engineering, research and design skill – the unequalled manufacturing and testing facilities – which Aerofin offers you.

To get the *right* answer – ask the Aerofin man.

Aerofin is sold only by manufacturers of nationally advertised fan system apparatus. List on request.

AEROFIN CORPORATION

410 South Geddes St. SYRACUSE 1, N. Y.

WE HEAR THAT . . .

PITTSBURGH PLATE GLASS CO., Fiber Glass Div., has begun production of superfine fiber glass, a thermal and acoustical insulation. Production will be expanded to bring in a furnace a month until four tanks and 50 bushings are in operation.

The 1951 annual report of the *AMERICAN RADIATOR & STANDARD SANITARY CORP.*, Pittsburgh, has been judged the best in the building equipment industry in the Survey of Annual Reports conducted by Financial World magazine.

A two-story brick addition to the *D. J. MURRAY MFG. CO.*, Wausau, Wis. was dedicated recently as part of the celebration of the company's 70th anniversary. About 750 people attended the dedication including officers, directors, stockholders, employees and civic representatives.

WESTINGHOUSE ELECTRIC CORP. is planning to expand its manufacturing operations with a new building, estimated to cost more than $1,000,000, at its Sturtevant Div. plant in Hyde Park, Mass. The Hyde Park plant manufactures air conditioning equipment, commercial fans and blowers.

The Air Conditioning Div. of *GENERAL ELECTRIC CO.* will discontinue the sale of commercial refrigeration machines of 2 hp and below, to manufacturers and refrigeration supply wholesalers, effective December 31, and *TECUMSEH PRODUCTS CO.* will warehouse and supply G-E replacement units and parts. General Electric will continue to manufacture refrigeration machines for use in its own products.

What are believed to be the largest expansion joints ever made for a gas turbine power plant, are being manufactured by the *SOLAR AIRCRAFT CO.*, San Diego, Calif. The joints have an inside diameter of 122 in.

The *T-V YORK CO.* of Bristol, Tenn. has moved to a new location on the Bluff City Highway, 11 E. The company also announced that *FRANK B. LOPER* now is a special sales representative for ice making equipment.

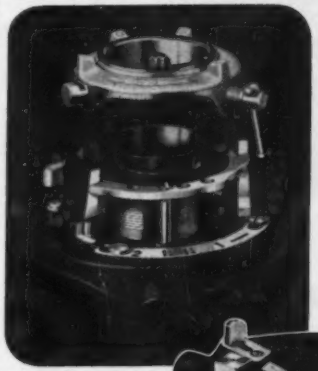
Thirty-four sales engineers were recently added to the field sales force of *MINNEAPOLIS-HONEYWELL REGULATOR CO.*, Industrial Div. All recent graduates of the company's industrial instrument training school in Philadelphia, the new salesmen will be assigned to 27 cities in 22 states.

KEROTEST MFG. CO. recently became a subsidiary of *TUBE TURNS, INC. GEORGE O. BOOMER*, president of Tube Turns announced that Kerotest will continue to operate under its own name, and its present officers and personnel have been retained.

For *Extra* Fast Easy Smooth Pipe Threading Choose

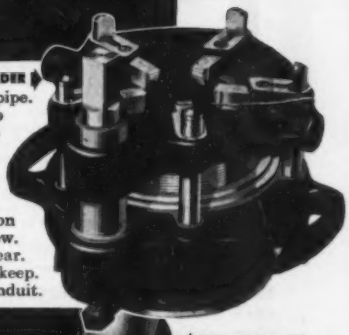
RIDGID

Work-Saver Die Stocks



JAM-PROOF 65R Perfect threads on 1" to 2" pipe with 1 set of 4 high-speed steel dies — sets to pipe size in 10 seconds. Lead screw on barrel won't jam on workholder—drive plate automatically kicks out driving pawl. Self-centering workholder sets instantly!

4P GEARED THREADER For 2½" to 4" pipe. Balanced loop handles—easy to lift 4P where you want it. Mistake-proof workholder sets to size before put on pipe—1 set screw. Safe enclosed gear. Practically no upkeep. Special 4P for conduit.



00R RATCHETS For ⅛" to 2" pipe. Heads snap into ratchet ring from either side, won't fall out. Precision-cut alloy dies reverse for close-to-wall threads. 00R and 0R, ⅛" to 1"; 111R and 11R, ⅛" to 1¼"; 12R, ¼" to 2". Conduit dies, too.

EXTRA VALUE RIDGID's are famous for efficient design, smooth performance, rugged durability. Every die stock factory tested. For top value for your money, buy RIDGID threaders from your Supply House.

THE RIDGE TOOL COMPANY • ELYRIA, OHIO

GRABLER

Give Relief from Time-Wasting Grief

Approved by Underwriters' Laboratories

Double check to find the difference in pipe hangers. There is a difference and it becomes apparent when journeymen use them. The difference results from engineered time-cost saving features. One way to discover the difference in pipe hangers is to use Square "Gee" Pipe Hangers on your next plumbing and heating jobs. You'll find that Grabler Square "Gee" Pipe Hangers give relief from time-wasting grief. Order them from your wholesaler.

Write for Wall Chart showing complete range of types of Grabler Square "Gee" Pipe Hangers and accessories.

THE GRABLER MANUFACTURING CO.
6565 BROADWAY, CLEVELAND 5, OHIO

THE SQUARE "GEE" LINE INCLUDES: Malleable Fittings • AAR Fittings • Unions • Rail Fittings • Cast Iron Steam and Drainage Fittings • Patented Drainage Fittings • Copper Tube Solder-Joint Fittings • Steel Pipe Nipples • Hangers

Approved by Underwriters' Laboratories

Approved by Underwriters' Laboratories

GRABLER

A sound-color motion picture, "Freedom and Power," has been produced by the *GENERAL ELECTRIC CO.*, Schenectady. The film, a combination of live action and animation, is designed to give the public a better understanding of the role electricity plays in national welfare and security. It is the latest presentation of the company's visual education series, "More Power to America."

A new trade-mark, based on the Promethean flame, has been selected by the *CLEAVER-BROOKS CO.*, Milwaukee. The new trade-mark depicts a hand holding the flame symbolizing the firm's production of equipment for the generation and utilization of heat.

J. W. ALSDORF, president of the *CORY CORP.* in Chicago, has announced the acquisition of an additional manufacturing plant in Grayslake, Ill., and the entrance of the company into the manufacture and sale of electric room air conditioners and electric dehumidifiers. The new one-story factory is approximately 52,000 sq ft on 14½ acres of land. Both the air conditioners and dehumidifiers will be marketed under the "Fresh'nd-Aire" trade name.

Field maintenance men and technical personnel from 34 industrial firms recently completed a course in instrument maintenance and repair sponsored by the Industrial Div. of the *MINNEAPOLIS-HONEYWELL REGULATOR CO.* In addition, about 65 service and sales engineers from the company are attending a 14-week course in industrial instrumentation. These sessions will run through December 19.

KORHUMEL STEEL AND ALUMINUM CO., Indianapolis, has been appointed distributor of industrial tube fittings, tube tools and O-rings manufactured by the Parker Appliance Co.

A week of intensive sales training recently was given by the *ALLEN-BRADLEY CO.* at Nippersink Manor, Genoa City, Wis. More than 250 district managers, sales representatives, factory supervisors and research men attended the meeting.

Business of the *NATIONAL RADIATOR CO.* for the first five months of the current fiscal year has been running ahead of that booked in the corresponding period of 1951. According to *ROBERT S. WATERS*, chairman of the board of directors, there is every indication that this upward trend will continue. Mr. Waters also announced the election of a new member to the board, *CHARLES HILL JONES*, senior vice president of the Manufacturers Trust Co. in New York.

M. M. LAWLER, assistant vice president, *WORTHINGTON CORP.*, has been awarded a certificate of service by the *AMERICAN STANDARDS ASSN.* in recognition of his work in the development of American Standards. Mr. Lawler is a member of the ASA Standards Council.

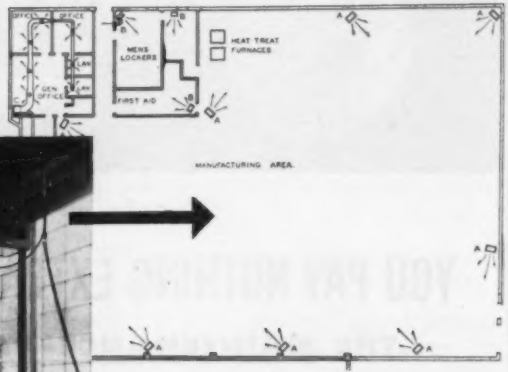
[*Continued on page* 217]

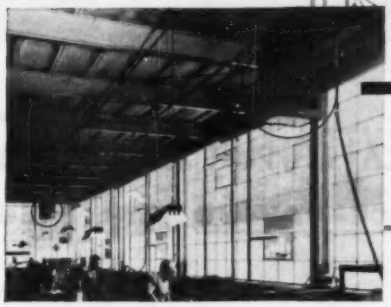
SAVE HALF* THE INSTALLATION COST—*Get Better Heating!*

*Actual Savings 49%—
Facts and Figures Available on Request. Ask for Bulletin 49.

Vahl Engineering Company. Plant, Brooklyn, N. Y.
Brown and Matthews, Inc., Contractors.

Twelve Janitrol Unit Heaters and one Winter Conditioner, installed by Frisse Plumbing Corporation, meet the plant and office 1,120,000 Btu/hr. requirements.





Part of manufacturing area. Suspended unit heaters amply compensate for heat loss from large glass areas.

Janitrol GAS UNIT HEATERS PROVIDE IDEAL WORKING CONDITIONS

In addition to important dollar savings made possible by the original Janitrol Unit Heater installation, prime consideration was given to efficient heating to assure the best possible working conditions.

While the large glass wall areas provide excellent natural light for precision manufacturing operations, heat loss is high. However, unit heaters are located and heat is directed where heat loss is the greatest, so that temperatures remain even throughout the entire manufacturing area.

When you specify gas unit heaters for plant, store, or any type of industrial or commercial building, it pays to find out why Janitrol's advanced design and construction make these units the first choice of "men who know heating best."

WRITE TODAY FOR YOUR COPY OF BUSINESSMAN'S BLUE BOOK OF BETTER HEATING

It gives numerous examples of correct unit heater installation practices to assure efficient heating with real operating economy.

SURFACE COMBUSTION CORPORATION • TOLEDO OHIO

YOU PAY NOTHING EXTRA FOR Amocel

...THE MAINTENANCE-SAVING PIPE INSULATION

Amocel for commercial uses—like famous Unarco higher-temperature Unibestos—is made from strong, resilient Amosite asbestos fiber. Designed for temperatures up to 600° F., it's a premium product in every way—clean appearance, long life, high efficiency—and it's easy to fit so you save from the first with this better insulation. Made in standard, 1½", and 2" thicknesses for pipe sizes from ½" to 12" in half-rounds with jacket and metal bands. Your Unarco Distributor has Amocel. Call him or write for literature.

- **UNHARMED BY MOISTURE, STEAM, OR FUMES**
- **LIGHT, STRONG—WITHSTANDS IMPACT AND VIBRATION**
- **MAY BE REMOVED AND REUSED REPEATEDLY WITHOUT DAMAGE OR LOSS OF EFFICIENCY**

UNARCO

UNION ASBESTOS & RUBBER COMPANY

DEPT. A-11, 332 SOUTH MICHIGAN AVENUE • CHICAGO 4, ILLINOIS

UNARCO

Distributor of the Month

Midland Engineering Co., Inc.

401 S. NOTRE DAME AVENUE
SOUTH BEND, INDIANA

1501 KENTUCKY AVENUE
INDIANAPOLIS, INDIANA

Since 1922, Midland Engineering Company has rendered capable thermal-insulation service to every phase of industry, and this valuable thirty years of experience is now available throughout Indiana and Southern Michigan.

Midland's organization of competent engineers will be glad to make recommendations, and supply all needs with insulations of proved Unarco quality.

If you are located within the area which Midland Engineering Company covers, write or phone for Unarco literature, helpful suggestions, and from-stock insulation shipments. In South Bend, the telephone number is 2-1441; in Indianapolis, it's Atlantic 7405.

INDUSTRIAL Insulations

PRODUCTS OF

UNION ASBESTOS & RUBBER COMPANY

[*Continued from page 214*]

representing the Air Conditioning & Refrigerating Machinery Assn. He has been very active as the ACRMA representative on ASA Committee Y53-Refrigeration Nomenclature.

PERFEX CORP. has announced the addition of *DENNIS SUPPLY CO.* to their network of distributors. The Dennis company's main office is in Sioux City, Iowa.

ARCHITECTURAL MODEL MATERIALS, INC., Chicago, is producing materials used for building miniature factories, stores, houses, farm buildings, etc., for use in sales promotion, advertising, engineering and so on. The materials are fabricated of wood and plastics to exact scale to produce three-dimensional models.

The 100th *IBR SCHOOL OF MODERN HEATING* (Sponsored by the Institute of Boiler and Radiator Manufacturers) was held in Saginaw, Mich., recently.

Three new sales divisions have been formed by *SCHAIBLE CO.*, Cincinnati. They are the Plumbing and Heating Div.; D. T. Williams Valve Div., and Disposer Div.

Three winners have been selected by the *AMERICAN WELDING SOCIETY* for the 1951-52 A. F. Davis undergraduate welding awards. They are: *PAUL J. WISNIEWSKI* and *DAVID A. THOMAS*, Cornell University, first prize, and *NORMAN FLETCHER*, University of Wisconsin, second prize.

SKIL CORP. is the new name of Skilsaw, Inc., Chicago manufacturer of portable electric and pneumatic tools.

The *INSTITUTE OF GAS TECHNOLOGY*, affiliated with the Illinois Institute of Technology, Chicago, this year presented the first of its summer refresher courses in gas engineering, covering natural gas and transmission and distribution.

ACME BRICK CO. recently moved into a new four-story building in Fort Worth providing them with 22,800 sq ft of office space, an assembly room, a snack bar and parking space for 50 automobiles.

The *H. S. CHAFFEE CO., INC.* has been appointed distributor-applicator for Kaylo Heat Insulation by *OWENS-ILLINOIS GLASS CO. HARLOE S. CHAFFEE* is president and treasurer of the Liverpool, N.Y. firm.

The Appleman Art Glass Works has changed its name to *ELECTRIGLAS CORP.* The change was made, according to *LEON APPLEMAN*, president, to more accurately describe their product, "Electriglas Radiant Heat Panels." Last month the company moved to a new office building constructed on the factory property in Bergenfield, N.J.

The appointment of three new franchise dealers in the South and Southwest has been announced by the *UNITED STATES AIR CONDITIONING CORP.* They are: *KEAT-*

Your All-Around Boiler

FOR ALL FUELS

AND ALL TYPES OF FIRING

The **TITUSVILLE** *"Compact"*

Steel Heating Boiler

Economical use of oil, gas or coal is an outstanding advantage of the Titusville "Compact" Boiler. An exceptionally large combustion chamber runs the full length of the shell, providing ample space and time for complete burning—yet the boiler takes up less room than any other type. ● Extensive automatic welding of seams and joints, positive circulation, steel flue-door assemblies and other refinements assure trouble-free service.

Write for Bulletin B-3000-B.

THE TITUSVILLE IRON WORKS COMPANY

A division of Struthers Wells

Representatives in Principal Cities

TITUSVILLE, PENNSYLVANIA

ING INSULATION & CONTRACTING CO., Charleston, S. C.; *PASCO DISTRIBUTORS*, Chattanooga, and *AIRE ENGINEERING CO.* of Tucson.

R. E. GROTE, president of the *METAL GOODS CORP.*, has announced the purchase of 17 acres of land to be used for a new plant site in St. Louis. Plans are being made to erect a two-story office of 50,000 sq ft. Directly behind the office building, a large modern warehouse of 150,000 to 175,000 sq ft, will be constructed.

The *BABCOCK & WILCOX CO.* has purchased the facilities of a former shipyard from the Brunswick Port Authority at Brunswick, Ga. and will convert it into a plant to build boilers and related equipment. The property consists of 110 acres.

The *MINNEAPOLIS-HONEYWELL REGULATOR CO.* has established a new factory in Amsterdam to manufacture heating controls abroad for the first time in the company's history. The Holland factory will produce automatic controls for oil fired furnaces.

An increase in capacity from 60 million to 100 million lb of pig aluminum a year, has been accomplished by *REYNOLDS METALS CO.* The increased capacity was made possible by enlarging the plant's 372 reduction pots.

A new company, *ECLIPSE FUEL ENGINEERING CO. OF CANADA, LTD.* has been formed to handle sales and service, according to an announcement by the parent company of Rockford, Ill. New offices have been established in Toronto and will be managed by *GORDON E. BOUVIER.*

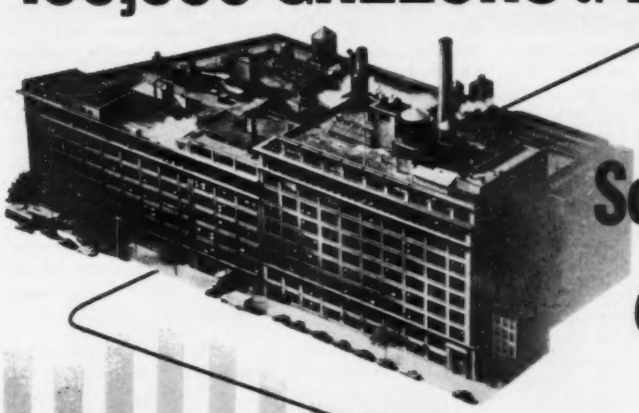
DR. N. F. BISGAARD, professor of heating and air conditioning at The Technical University of Denmark, recently visited the *TRANE CO.* as part of his cross-country tour of manufacturers in this field. He is studying American air conditioning, heating and heat exchange equipment.

The *AMERICAN RADIATOR & STANDARD SANITARY CORP.* has become a full member of the Institute of Boiler and Radiator Manufacturers.

A new expanded office for *CARRIER CORP.* will be built in Charlotte, N.C. Located at 2610 S. Boulevard, the office will house the direct and dealer sales office plus a pipe fabricating shop now located at Anderson, S.C. Occupancy of the building is scheduled for this month.

The *S. T. JOHNSON CO.* has purchased complete control of the firm of *MEARS-KANE-OFELDT, INC.*, manufacturers of gas and oil fired high pressure steam boilers. The business will be operated and expanded as a division of the S. T. Johnson Co. *ROBERT P. JOHNSTON*, vice president, is in charge of the Mears-Kane-Ofeldt, Inc. Div. and will also continue in the capacity of Director of Eastern Operations.

100,000 GALLONS OF HOT WATER used at Schrader Valve every day . . .



Partial view of extensive sanitation requirements at Schrader Valve supplied with 140° F. hot water by Taco Instantaneous Heaters.

Duplex Champion Dishwashers in cafeteria where up to 1900 employees are served daily. Hot water at 180° F. supplied by a Taco Instantaneous Heater.

Better Heating-Better with Taco

FIVE TACO HEATERS INSTALLED SINCE 1937....NO MAJOR REPAIRS IN ENTIRE 15 YEARS!

In 1937, Schrader, world's largest maker of auto tire air valves, installed one Taco Water Heater. Now they have five . . . all instantaneous Tacos.

Every day throughout the year Schrader's Tacos are on the job . . . heating 100,000 gallons of water with 5 lb. live steam to 140° or 180° F. Supplied with abundant hot water are one Champion Duplex Dishwasher, two Bradley 34" dia. Wash Fountains, 350 wash basins, 25 8 to 30 ft. wash troughs and 15 hot water showers. Another 10,000 gallons is supplied to rinse tanks for processing metal products.

More proof that it pays to bring your hot water heating problems to Taco!

Write for Simplified Selection Chart for sizing Taco Water Heaters under any conditions of operation and service.

Taco

TACO HEATERS, INCORPORATED 137 SOUTH ST., PROVIDENCE 3, R. I.

WHO'S WHAT

JOHN HELLSTROM, vice president of *AMERICAN AIR FILTER CO.*, Louisville, has been appointed director of sales of all AAF and Herman Nelson products. Formerly, he managed the company's Pacific Div. in San Francisco. His assistant is *ROBERT W. NELSON*, vice president, formerly of the Herman Nelson Div.

New advertising and publicity manager for the *L. J. WING MFG. CO.* is *DONALD A. BURNS*. Mr. Burns was formerly with John Moynahan & Assoc., public relation counsel.

J. D. GREENSWARD has been named vice president, director of manufacturing, general machinery division, *ALLIS-CHALMERS MFG. CO.* He had been general manager of the company's Norwood, Ohio, Works and has been with the company since 1922. *P. F. BAUER* has been named general manager of the Norwood Works.

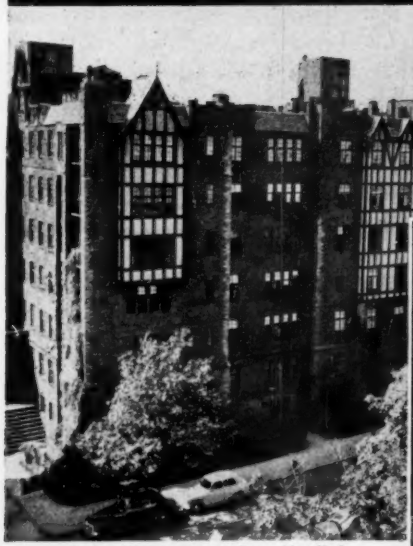
ANDREW GAGARIN, formerly vice president of the *TORRINGTON MFG. CO.*, now is the new president. He will succeed *S. W. FARNSWORTH*, January 1, 1953, when Mr. Farnsworth becomes chairman of the board. Mr. Gagarin joined the organization in 1946 as a member of the production control department, and served as assistant to the vice president in charge of manufacturing and assistant to the president before becoming vice president in 1950.

B. LeB. MUSGRAVE has been reassigned by the *MIRACLE ADHESIVES CORP.* to supervise the Insulation Dept., as part of several major changes in organization made by the company. Mr. Musgrave gained wide insulation experience in Europe, India and South America as supervising engineer for the Foreign Dept. of Richard Crittall and Co., Ltd., London, heating and air conditioning engineers. In 1951 he joined Devices, Inc., a subsidiary of the Miracle Adhesives Corp. Now, under Mr. Musgrave, the Insulation Dept. offers to engineers, architects, manufacturers, and all users of insulation, a technical advisory service concerning the most effective methods of bonding insulation to various surfaces with Miracle Adhesives and Miracle Surface Anchors. This department also tests new insulating methods and products.

KARL E. JOHNSON, who for the past six and one-half years has represented *J. F. PRITCHARD & CO.* as Chicago district sales manager, has been named to succeed *RAYMOND C. KELLY* as manager of the company's Equipment Div. in Kansas City, Mo. *E. ALLEN BAILEY* will succeed Mr. Johnson in Chicago. Mr. Kelly now is executive manager of the Cooling Tower Institute, a group which he helped organize.

J. HOWARD SMART has been elected president of *TUTTLE & BAILEY, INC.* Mr. Smart has been with the corporation since 1923 and is one of its directors.

New York apartments reduce operating costs with Perfex Industrial Instruments



Hudson View Apartments, Bronx, New York

Typical panel board installed with each boiler unit.

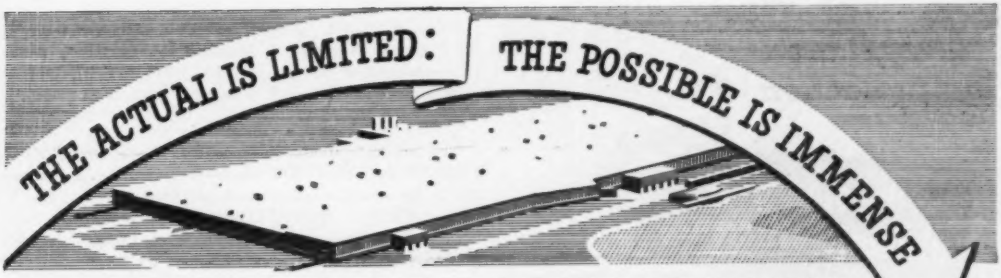
Perfex Industrial Instruments

- conserve fuel
- reduce smoke
- save operator's time
- increase life of boiler and burner

Write for your free bulletin for gas, oil or stoker-fired equipment.

PERFEX INDUSTRIAL INSTRUMENTS

PERFEX CORPORATION, MILWAUKEE, WISCONSIN
In Canada
Perfex Controls, Ltd., Guelph & Toronto



NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

© LE Co. 1952

SIMPLIFIES FABRICATION

Fig. 1— Prefabricating 8" Spool in *temporary field shop, set up next to job, eliminated delays in getting fabricated pipe components to erection crews.*

SPEEDS · CONSTRUCTION

Fig. 2—Field Welding *6" flange to elbow with Lincoln "Fleetweld 5", using Lincoln "Shield-Arc" motor driven arc welders.*

TEAMS QUALITY WELDS WITH LOW COST

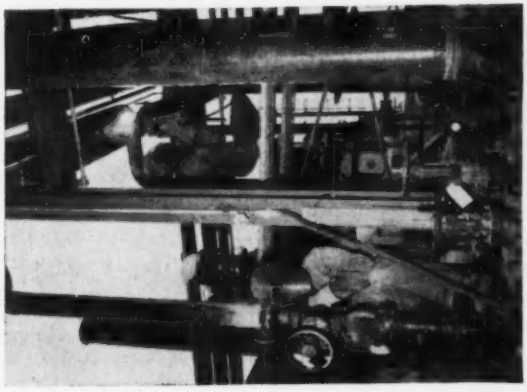


Fig. 3—"Fleetweld-Shield-Arc" Team *speeds erection of pipe in processing plant.*

SPEEDS ERECTION . . . CUTS COSTS

TO simplify construction and save time and cost, this contractor set up his own pipe shop next to the job itself. Pipe sections were accurately prefabricated on the site from welding fittings, flanges and ells by working closely to dimension with construction crews. Semi-production methods made possible by this close co-ordination enabled use of faster "Manual Lincolnwelding" of pipes to flanges. On other connections, pressure-type welds were produced at low cost with Lincoln "Fleetweld 5" and "Shield-Arc 85"* using Lincoln 300 amp "Shield-Arc" DC motor driven welders.

*Preferred standard for electrodes on quality work.

PROCEDURES FOR WELDING PIPE

Latest data on layout and welding of pipe is found in the new Ninth Edition "Procedure Handbook of Arc Welding Design and Practice". Price only $2.00 postpaid in the U.S.A.; $2.50 elsewhere.

Bulletin 403, Welding Guide, free on request. Write to Dept. 283,

THE LINCOLN ELECTRIC COMPANY

CLEVELAND 17, OHIO

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

a Basic Principle for protection

developed to ultimate efficiency

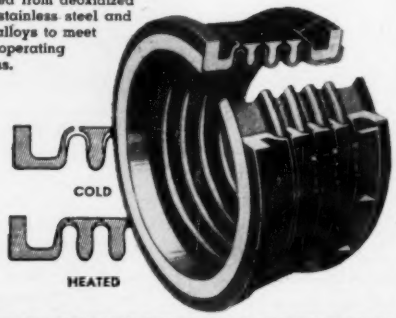
in Badger Expansion Joints

Directed-Flexing Self-Equalizing . . . exclusive features of Badger Expansion Joints

Badger Manufacturing Company developed its *Directed-Flexing, Self-Equalizing* expansion joints with lasting protection to costly equipment in mind. The all-curve pattern of the corrugated member eliminates sharp bends and structure weakening stresses which assure long maintenance-free life.

In combination with the correspondingly shaped Badger Self-Equalizing ring, progressively controlled movement of *each* corrugation insures a more flexible, longer lasting joint. Buy Badger Joints and you get flexibility, Directed-Flexing Self-Equalizing and these features:

- Packless . . . pressure-tight single tube—requires no maintenance
- Compact . . . approximately the size of flanged fitting
- Special forming . . . no structure-weakening stresses
- Controlled heat treating . . . assures long life
- Wide range of traverse — pressure — temperature Fabricated from deoxidized copper, stainless steel and special alloys to meet various operating conditions.



BADGER MANUFACTURING COMPANY

Original and Sole Manufacturer of Badger Expansion Joints

230 BENT STREET • CAMBRIDGE • MASS.

CARL R. SARE, formerly assistant to the president of the Patterson Foundry & Machine Co. has been elected vice president of the *W. W. SLY MFG. CO.* He will be primarily concerned with promoting dust filter sales.

New officers of the *GAS APPLIANCE MANUFACTURERS ASSOCIATION* assumed their duties at a meeting of the board of directors held October 30 in Atlantic City. *JAMES F. DONNELLY*, assistant general manager of Permaglas-Heating Div., A. O. Smith Corp., succeeded *LOUIS RUTHENBURG* as president of GAMA. Other new officers include: *SHELDON COLEMAN*, president of the Coleman Co., Inc., first vice president; *T. T. ARDEN*, chairman of the association's Pacific Coast Manufacturers Section, second vice president; *LYLE C. HARVEY*, president and general manager of Affiliated Gas Equipment, Inc., treasurer, and *H. LEIGH WHITELAW*, the association's managing director, secretary.

WALTER L. SMITH, works manager for the Chase Metal Works since 1946, has been elected vice president in charge of operations and director of *CHASE BRASS & COPPER CO., INC.* He joined the company in 1915.

New vice president of the *AMERICAN HYDROTHERM CORP.* is *OLIVER F. JOHNSON* of Washington, D.C.

Promotion of *L. F. REIMANN* to assistant vice president of manufacturing at *JACKSON AND CHURCH CO.* has been announced by the firm's president, *CLIFFORD W. STUART*. Associated with the company for 27 years, Mr. Reimann has been superintendent since 1951.

HAROLD A. BURNIP has been appointed director of purchase engineering for the *LINCOLN ELECTRIC CO.* He has been with the company for 10 years and most recently, as a project engineer, he supervised the building of Lincoln's new plant.

MILTON L. EDGREN has been promoted to national supervisor of transportation service for *MINNEAPOLIS-HONEYWELL REGULATOR CO.*, with headquarters in Minneapolis. Previously he was transportation and service engineer in Chicago. Prior to that he had been with the Pullman Co. for 16 years.

FLEXIBLE TUBING CORP. has named *REED A. WEYBURN* as representative-distributor sales. Prior to joining the company, he had been with the Connecticut Light & Power Co. for seven years.

B. W. HENN has been appointed assistant sales manager of *SCHNACKE, INC.* in charge of sales of compressors and condensing units.

WILLIAM J. THOMAS, general sales manager of the *TUBULAR PRODUCTS DIV., BABCOCK AND WILCOX CO.*, has been named to the board of directors of

the division. He has been associated with the company since 1932 and has been with the division since 1941.

W. WHITNEY KUENN has been appointed sales manager of the newly created *AIR CONDITIONING PRODUCTS DIV.* of *OWENS-CORNING FIBERGLAS CORP.* He will coordinate sales efforts. *CLIFFORD L. ROWLEY* will head the new *BATTERY & PROCESS PRODUCTS DIV.*

ERIC V. OLSSON is the new vice president in charge of engineering of the *BRISTOL SHEET METAL CO.* He had been manager of the Washington branch of the Sturtevant Co.

T. H. WICKENDEN, vice president in charge of development and research of the International Nickel Co., Inc. has been elected a member of the *WELDING RESEARCH COUNCIL OF THE ENGINEERING FOUNDATION* for a three-year term.

Five engineers have received promotions at *WORTHINGTON CORP.* They are: *JOHN E. LANCASTER*, new assistant chief engineer of the Air Conditioning and Refrigeration Engineering Div.; *WILLIAM C. OSBORNE*, manager of the Research and Development Dept.; *NORMAN L. MEYERSON*, assistant manager of the Research and Development Dept.; *FREDERICK C. GILMAN*, research engineer, and *T. A. HERMAN*, assistant chief engineer of the Reciprocating Engineering Div.

H. SKIDMORE OLSEN has been appointed director of personnel and industrial relations for all activities of *MINNEAPOLIS-HONEYWELL REGULATOR CO.* plants in Minneapolis. He succeeds *JOHN R. LENOX* who was named director of the company's aeronautical manufacturing.

PAUL O. PENN has been appointed to the newly created post of executive engineer and a member of the executive committee of *PENN CONTROLS, INC.* He will direct the activities of the research engineering program. He joined the company in 1930.

GEORGE A. SCHILLER has been named assistant sales manager of the *DOLLINGER CORP.* He formerly was associated with the Dustex Corp.

E. W. PETERSEN has been appointed general sales manager of the *AMERICAN BLOWER CO.* He joined the company in 1923 and became merchandise manager for the packaged products of the corporation's heating and ventilating divisions in 1932. In 1951 Mr. Petersen was named assistant general sales manager.

ROBERT P. MARSHALL has been appointed superintendent of the Air Conditioning Div. at *SERVEL, INC.* In this capacity he will supervise the production of air conditioners. Mr. Marshall, who has been with the division since its inception, replaces *RICHARD F. SCHIEWETZ*,

greater efficiency for

Commercial and Industrial

GAS

fired heating plants with

Field

"M-G" draft controls

1. Double acting gate opens inward to regulate up-drafts and outward to relieve down-drafts.
2. Adding or taking off weights provide simple adjustment for up-draft conditions at time of installation.
3. Control will relieve internal or down-draft pressures of only a few thousandths of an inch.
4. Weights attached to gate itself are factory set to insure extreme sensitivity to down-draft conditions.
5. Corrosion resistant knife edge bearings resting on self-aligning bearing plates assure extreme sensitivity yet long life.
6. Side wings improve the regulation, making the control accurate at all gate positions.
7. Long collar keeps gate out of the path of flue gases—resulting in greatly increased life.

Now there is a Field Draft Control to provide for commercial gas-fired heating plants the same accurate, dependable, fuel-saving performance that has made Field first choice for oil and coal furnaces. The new Field "M-G" for gas is fully proven, widely accepted, fully safe — a control specially designed for gas but retaining all outstanding design features of the Field Type M Control. Write today for complete information.

FIELD CONTROL DIVISION

of H. D. Conkey & Company — Mendota, Illinois

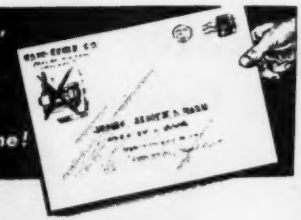
UP-DRAFT VIEW

Gate opens inward to regulate updrafts in conventional, proven manner, checking any excess in draft.

DOWN-DRAFT VIEW

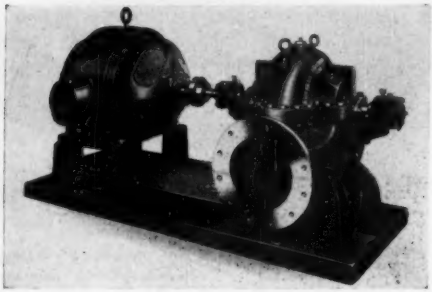
Gate opens outward to relieve down drafts which might affect flame. An optional safety switch closes main gas valve in case of prolonged down draft, thus providing full protection.

The "LOW-BID" PUMP isn't necessarily the economical one!



"Buffalo" PUMPS

Save Money on the Job — WHERE SAVING COUNTS!



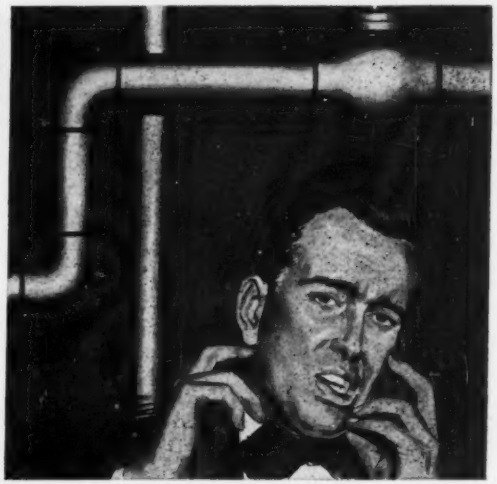
Above, for handling clear water, 10 to 14,000 gpm, you can't beat a "Buffalo" Type "SL" Pump.

For clear water, any temperature, at pressures up to 500 pounds, specify a "Buffalo" Type "RR" Pump.

If the pump has been built down to a price rather than up to a quality standard, chances are that any savings on first cost will be nullified by continual repair and replacement costs. "Buffalo" Pumps have always been built to save your maintenance men trouble, to keep delivering for a maximum number of years and to use minimum power.

But why not get the construction and performance facts? Write today for Bulletins 955-N and 980-B, and see why "Buffalo" Pumps save money the minute they start on the job.

"Buffalo"
BUFFALO PUMPS, INC.
171 MORTIMER STREET BUFFALO, N. Y.
Subsidiary of Buffalo Forge Company
Canada Pumps, Ltd., Kitchener, Ont. Sales Representatives in all Principal Cities
A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID



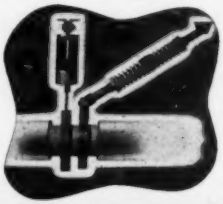
Your Piping Got
THE SHAKES?

It's amazing how "palpitating piping" can run up repair bills and wreck dispositions! But there's no need to put up with it.

BLAW-KNOX PIPE HANGERS

and Vibration Eliminators will stop those jitters and save you money immediately. These are *standard* devices, and can be ordered and installed directly from technical information contained in Catalog No. 51. Any problems concerning thermal movement, weight of piping materials and location of supports have been solved in advance by Blaw-Knox Power Piping Engineers. In other words —we supply you with both the dish and the recipe.

BLAW-KNOX CONSTRUCTION CO.
Power Piping & Sprinkler Division
1525 Pennsylvania Avenue
Pittsburgh 33, Pa.



CATALOG NO. 51 *has proved a time and money saver for design engineers as well as plant superintendents. Please request it on your letterhead.*

BLAW-KNOX PIONEERS IN THE DEVELOPMENT OF
FUNCTIONAL HANGERS
VIBRATION ELIMINATORS

who resigned to become plant manager for the *TRANE CO.*

CHARLES E. MERTLER now is vice president in charge of engineering and development of the *STEVENS MFG. CO.* Mr. Mertler, who has been chief engineer of the company since 1950, formerly was with Westinghouse Electric Corp., Appliance Div., for 21 years where he last served as assistant manager of quality control.

R. P. DeVRIES, chief engineer of the *REVERE SUGAR REFINERY,* retired recently. His successor is *CHARLES J. DETTLING.*

RICHARD M. LOCKE has been promoted by *MINNEAPOLIS-HONEYWELL REGULATOR CO.* to account executive in sales. He will be in charge of sales of automatic control equipment to manufacturers in the window cooler market and the domestic heating and cooling market. Since 1950 he has been assistant sales manager of the wholesale division.

ARTHUR M. HOOVER has been elected president of *RANCO INC.* to succeed *E. C. RANEY,* who is now chairman of the board. Mr. Hoover has been with the company since 1920 and vice president since 1935.

JOHN DUNCAN, JR. has been promoted to director of trade relations for *OWENS-ILLINOIS GLASS CO.* He has been representing the Kaylo Div. in a similar capacity and now will handle special assignments for all units of the company.

GEORGE W. ROPER, formerly project engineer, now is assistant technical director of the dust and fume control division, *AMERICAN WHEELABRATOR & EQUIPMENT CORP.*

WILLIAM J. WEIR has been appointed sales manager of wholesale accounts for *CHASE BRASS & COPPER CO., INC.*

JACK CANADY, formerly sales promotion manager of the *McCRAY REFRIGERATOR CO.,* has been promoted to sales manager of the *PALMER MFG. CORP.* The Palmer firm in Phoenix is a recently acquired subsidiary of the McCray Co. New assistant advertising manager for both concerns is *GEORGE W. BENSON.*

R. B. STOTZ has been appointed manager of the *AIR-TEMP CONSTRUCTION CORP.,* a subsidiary of the *CHRYSLER CORP.* Mr. Stotz, who has been with the corporation since 1945, formerly was director of activities in New York, Boston and Philadelphia. He replaces *I. C. BAKER,* who died recently.

New vice president of the *STEVENS MFG. CO.* is *GEORGE H. ROUSE.* He has been with the company for two years.

HOW PIPES ARE SUPPORTED IN

Therm-O-Tile

REG. U.S. PAT. OFF.

Underground Steam Conduit

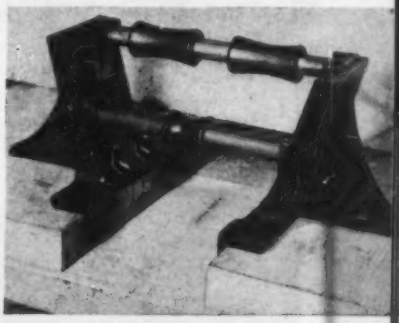


Fig. 1 — At the right is shown a Therm-O-Tile Pipe Support for three or more lines. These supports are of cast iron and they are adjustable. See Figures 3 and 4 for typical applications.

DIRECTLY FROM CONCRETE BASE

All pipes in Therm-O-Tile Underground Conduit are supported directly from the rigid concrete base, as illustrated in Figures 1, 3, and 4. They are therefore independent of the tile envelope. This prevents any strain on the joints of the conduit when the lines are expanding or contracting in service. Fully illustrated in Bulletin 511.

Fig. 2—Therm-O-Tile assembly view. Note the channel drain in the concrete base which assures "permanent protection" of the insulation and high efficiency for all time.

INSTALLATIONS EVERYWHERE

In addition to our own offices given below, Therm-O-Tile is represented by Johns-Manville Technical Service Units in all principal cities. Since installations have been made nearly everywhere — as far north as Alaska — it is quite possible that they have been made not far from you.

Complete information concerning Therm-O-Tile — uses, construction details, illustrations, etc.— will be found in Bulletin 511. Ask for a copy.

Fig. 3—Showing the use of filler type insulation. Note the Pipe Supports.

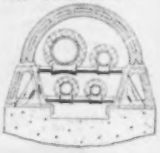


Fig. 4—Showing the use of sectional pipe covering. Here the pipes rest directly on the pipe supports.

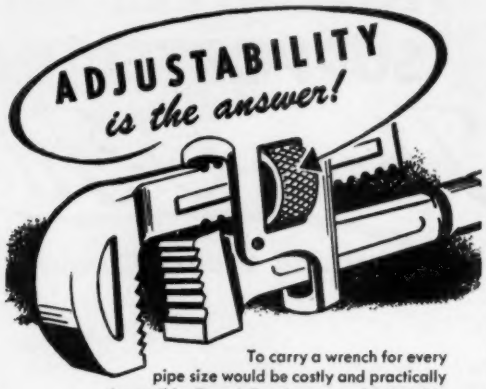
H. W. PORTER & CO., INC.

822-H Frelinghuysen Avenue • Newark 5, N. J.

REID HAYDEN, INC.

BALTIMORE, MD. RICHMOND, VA. CHARLOTTE, N. C.

Insulation Engineers & Contractors



To carry a wrench for every pipe size would be costly and practically impossible. Especially when several adjustable pipe wrenches will take care of most of your needs. That's the sensible answer to a very ordinary problem.

4200 Series Cast Iron Tank

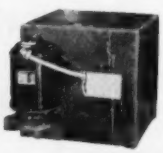
Sterlco CONDENSATION PUMPS

√ EASY to SELECT √ CONVENIENT to STOCK

Yes, only two sizes are required to take care of all jobs up to 15,000 sq. ft. EDR . . . and up to 20 lbs. discharge pressure. The adjustable float switch — so simple to set at required position — plus other Sterlco features make this possible . . . and only possible with a Sterlco Pump.

For you . . . this means less working capital tied up in floor stock. *For your customers* . . . this means that a future increase of radiation may not necessitate the installation of a new pump.

Combine this exclusive Sterlco feature with overall rugged construction and low cost and you find the reason Sterlco PUMPS are first choice of the industry. Yes, Sterlco will always do a better job . . . longer! Send for complete information on Sterlco Pumps.



Sterlco 4100 series for jobs where steel tank is preferred — same features as 4200 series.

STERLING, INC.

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HEATING SPECIALTIES

TEMPERATURE CONTROLS

IN THE TERRITORIES . . .

For *BRISTOL SHEET METAL CO. — MICHAEL FABBRI* is manufacturer's agent in the New England area for "Bristol Blower Housing."

For *PARKER APPLIANCE CO. — LEWIS C. ELY* is industrial sales engineer in the southeastern states with headquarters in Atlanta. For the past several years he has been an industrial sales engineer with the Globe Machinery & Supply Co. and with the Metal Goods Corp.

For *TUBULAR PRODUCTS DIV., BABCOCK & WILCOX CO. — J. Y. McCANDLESS* is in charge of the new district sales office in Syracuse. He has been on the technical staff of the general sales office at Beaver Falls, Pa. for the past 12 years.

For *DeLAVAL STEAM TURBINE CO. — R. G. BAKER* is regional sales representative for Chicago, Detroit and Minneapolis, with headquarters in Chicago. He has been manager of the Chicago district office since 1934. *C. C. BRAY* is now the manager of the Chicago office.

For *RICHMOND RADIATOR CO. — C. W. KESSLER* is now a member of the sales organization. His headquarters are in Pittsburgh and he will cover the state of Ohio.

For *RELIANCE ELECTRIC & ENGINEERING CO.* — Two new sales application engineers: *WILLIAM F. KISER, JR.* in the Philadelphia district sales office; *ROBERT T. JENNINGS* in the Detroit district office.

For *WOLVERINE TUBE DIV.*, Calumet & Hecla Consolidated Copper Co. — New sales district and several promotions and transfers: new district covers an east-central area with *JACK H. SMITH* as the district sales manager. District sales offices will be maintained in Dayton where he is presently located as sales representative. *A. S. KINGERLEY*, who has been for many years a sales representative in the Detroit area, is the manager of wholesaler sales. *S. C. SEEKELL*, for several years a sales representative in Grand Rapids, will return to that territory replacing *JAMES A. JOLLY*, who will be transferred to the Dayton area. *RICHARD B. FLYNN*, formerly the Detroit plant sales manager, has replaced Mr. Kingerley as sales representative in the Detroit area. *FRED F. MOORE, JR.*, sales representative in the eastern district with offices in New York, is assistant district sales manager in that area now.

For *WINDMASTER CORP.* — Nine new sales representatives: *R. WENDELL FRANKS*, inventor of the Windmaster Draft Control and chief engineer of the company, Indiana, Illinois, Wisconsin territory; *WILLIAM J. DEBLER, SR.*, New England; *GEORGE D. KINGSLAND*, Illinois, Missouri and Kansas; *VIRGIL E. DUNNING*, Minnesota, Iowa and the Dakotas; *O. W. DOBSON*, New York City and New Jersey; *DANIEL FREEDMAN*, east-

This brand new, fact-packed

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will help you select the right nozzle for cooling, for humidification, for washing, for chemical processing and for hundreds of other applications.

Binks new 40-page Catalog No. 5200 is one of the most comprehensive and best organized books ever prepared on industrial spray nozzles. Data given includes nozzle dimensions, capacities and spray angles. There are plenty of nozzle illustrations, cut-away drawings and "blue-print" type installation sketches. In short, it has everything a buyer or designer needs to quickly select the correct nozzle for a specific application or process.

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Attractive, tailor-made Atlas Cabinets have stream-lined rounded corners, modern hardware and are beautifully finished in oven-baked hammerloid in colors of your choice. There are no bolts or screws and it fits together smoothly and quickly, producing savings in installation costs.

Atlas Cabinets are built to your specifications. They will carry your name and trademark and not that of Atlas. We can produce a full range of all models.

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A distinguished Pair of Dual Fuel Burners

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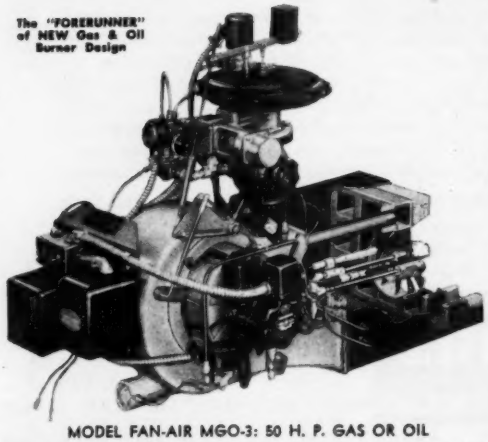
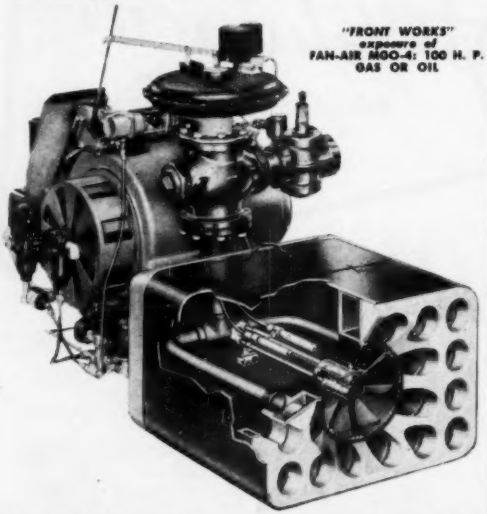
The "FORERUNNER" of NEW Gas & Oil Burner Design



MODEL FAN-AIR MGO-3: 50 H. P. GAS OR OIL

SEEING IS BELIEVING so we proudly present two pictures of the "FAN-AIR MGO" SERIES MECHANICAL DRAFT combination GAS & OIL BURNERS. Designed to fill the trend and need of the Gas Industry, employing the ENTRAINED COMBUSTION PRINCIPLE of low gas pressure service combined with oil in a revolutionary manner.



"FRONT WORKS" exposure of FAN-AIR MGO-4: 100 H. P. GAS OR OIL

A simple "flip of the switch" or automatic remote control, changes from GAS to OIL or in reverse. Air register synchronized to both fuels: delayed oil valve prevents smoky starts: full gas and oil retention: centrally assembled appurtenances instantly removable: no complex adjustments necessary: GAS or OIL and AIR mixed within burner head: It's an exclusive METTLER design with patents pending. Nothing else like it on the market. WRITE FOR BULLETIN 12-S.

The METTLER CO. Inc.

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ern portion of Pennsylvania, Maryland and Delaware; *HARRY M. HADLEY*, West Virginia and western Pennsylvania; *CHARLES MURMAN*, northern Ohio and parts of Michigan; *PERRY GUEST*, Virginia and the Carolinas.

For *BLACK, SIVALLS & BRYSON, INC.* — *WEEKS ENGINEERING CO.*, St. Louis is the exclusive representative and distributor in the eastern half of Missouri and the southern part of Illinois.

For *SPRINGFIELD BOILER CO.*, Springfield, Ill. — New representative, *HOMER J. HANSEN*, 608 Grand Theatre Bldg., Peachtree St., Atlanta 3.

For *ACRO MFG. CO.*, Columbus — *JOHN PHILLIPS* is sales engineer in the New England territory with headquarters in Hingham, Mass. He had been district representative in the sales department of the Boston Edison Co.

For *PARKER APPLIANCE CO.* — *J. J. MATICH* is industrial sales engineer with headquarters in Indianapolis. His territory includes Indiana and Louisville. He had been a sales engineer with F. H. Langsenkamp Co.

For *ALLOY STEEL PRODUCTS CO.* — *HERBERT V. EVANS, JR.* is district manager at Wilmington, Del. For the past five years he has been sales representative in Pittsburgh. In his new capacity, Mr. Evans will concentrate on direct selling activities in the Wilmington area but will have management responsibility for sales operations in the central Atlantic area extending from Philadelphia through Virginia and to the western boundary of Ohio and West Virginia.

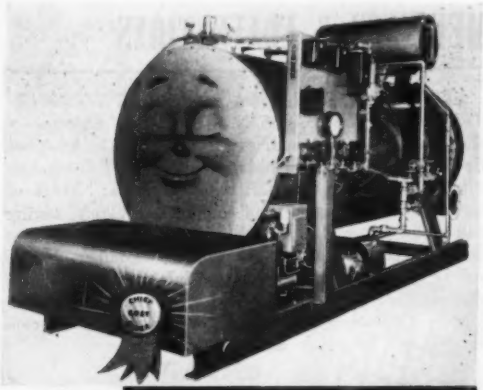
For *PERFEX CORP.*, Milwaukee — *CHARLES B. SOPER* is manager of the new Boston branch office, in charge of Control Div. sales. He has been with the company since 1936.

For *SUPERIOR COMBUSTION INDUSTRIES, INC.*, New York — *JOHNSON-HEYCK INC.*, 430 West Bldg., Houston 2, is sales representative in Texas for heat exchangers.

For *A. O. SMITH CORP.*, Milwaukee — Headquarters for the New England sales operations have been moved from Boston to Springfield, Mass. The new office, headed by *W. T. HALKET*, is at 95 State St.

For *UTICA RADIATOR CORP.*, Utica, N.Y. — *EDWARD W. GREEN* is sales representative for the Philadelphia territory.

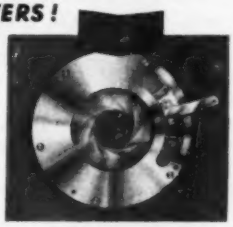
For *WILLIAMS OIL-O-MATIC DIV.*, Eureka Williams Corp., Bloomington, Ind. — *CARROLL V. LEIBENSPERGER* is field sales representative for Berkshire County, Mass., western Connecticut, and several northeastern New York counties.

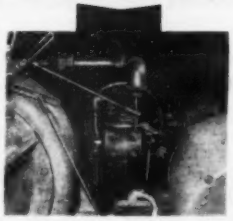


"OUR STEAM-PAK GENERATOR WAS REWARDED FOR CUTTING OUR COSTS $10,000 LAST YEAR"

Modern steam production with York-Shipley Steam-Pak Generators shows unbelievable savings in fuel, maintenance, and installation costs. For instance, an installation in the shops of middle western railroad paid for the installation and saved $10,000 during the first year of operation.

THESE STEAM-PAK *EXCLUSIVES* ARE *REAL COST SAVERS!*





Steam-Paks, the modern steam generators, built by York-Shipley, regulate themselves automatically by load demand, furnishing steam or hot water when required. The Iris Shutter air control (upper right) and Metering Oil Pump (lower right) supply the correct amount of air and oil as required by load demand. This means highest combustion efficiency, lower operating costs. Steam-Paks cover the full range from 15 to 300 hp. for low or high pressure steam or hot water and are fired by oil, gas, or a combination of oil and gas.

GET YOUR COPY OF THIS MANUAL TODAY!

"Steam in a Package"—a 14 page book which tells the installation and operating advantages of York-Shipley Steam-Pak Generators. Write today for your free copy of Bulletin 201.

YORK-SHIPLEY, INC.

INDUSTRIAL DIVISION, YORK 7, PA.

AUTOMATIC HEAT AND POWER SPECIALISTS SINCE 1918

this TRANSITE* Industrial Vent Pipe is good for many years more!

This 80-foot Transite stack vents corrosive gases from a trunk sewer in a large city. In excellent condition after 14 years, it has already outlasted the original metal breechings.

Typical of the long service life you can expect from Transite Pipe in solving tough venting problems, this durable asbestos-cement product successfully resists a wide variety of corrosive industrial fumes and gases and vapors which seriously affect other pipe materials in a short time.

Because Transite Industrial Vent Pipe is non-metallic and is therefore rustproof, it requires no paint or other protective treatment. Due to its unusually high chemical stability, it has substantially reduced replacement and maintenance costs in duct, vent and stack systems in plants across the country.

It is light in weight, easy to handle, easy to install, can be cut and drilled with ordinary tools. It comes in a complete range of sizes up to 36" in diameter . . . with a full line of rustproof, corrosion-resistant Transite fittings which make it adaptable to practically any job requirement.

For further details on Transite for industrial venting, write to Johns-Manville, Box 60, New York 16, N. Y. Ask for Data Sheet Series DS-336. In Canada: 199 Bay Street, Toronto 1, Ontario.

*Transite is a registered Johns-Manville trade mark

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TRANSITE Industrial Vent **PIPE**

For 35 Years the Fabulous Broadmoor Hotel Has Relied on FRICK Refrigeration

Eileen Seigh, champion skater, Olympic team member and skating instructor, admires one of the Frick ammonia compressors at the Broadmoor.

Built in 1917, the Broadmoor at Colorado Springs has ever since used Frick equipment . . . for making ice, cooling a dozen kitchen boxes, freezing foods, and operating an ice skating rink, measuring 185 by 85 ft., the year 'round.

You get the ultimate in dependability when you specify Frick Refrigeration or Air Conditioning.

DEPENDABLE REFRIGERATION SINCE 1882
FRICK CO.
WAYNESBORO, PENNA. U.S.A.

This building houses the Broadmoor Skating Rink.

MEETINGS & CONVENTIONS

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS, 435 N. Waller Ave., Chicago — 43rd annual convention, November 12 to 14, Adolphus Hotel, Dallas. Fourteen technical papers and discussions will be presented. Some of the subjects are: design of air conditioning systems and cold storage plants; testing and rating of refrigeration blower coils, and the latest developments in evaporator designs. Another feature will be the Bureau of Refrigeration Information to be conducted by 20 experts in the field. The Southwestern Engineers' Conference meeting two days preceding the convention will be guests at the gathering.

BUILDING RESEARCH ADVISORY BOARD, 2101 Constitution Ave., N. W., Washington 25, D. C. — November 18 and 19, main auditorium of the National Academy of Sciences. Conference will be on "Housing and Building in Hot-Humid and Hot-Dry Climates." Plans call for a coverage of the subject with reference to building problems in the southern, mid-southwest and far southwest states and comparable tropical and sub-tropical areas elsewhere in the world. Panel discussions will follow each session.

WESTERN REGION OF THE NATIONAL ASSOCIATION OF CORROSION ENGINEERS, 1061 M & M Bldg., Houston 2 — second annual Corrosion Conference, November 20-21, Biltmore Hotel, Los Angeles. The regional meeting comprises the states of Washington, Oregon, California, Idaho, Nevada, Utah and Arizona.

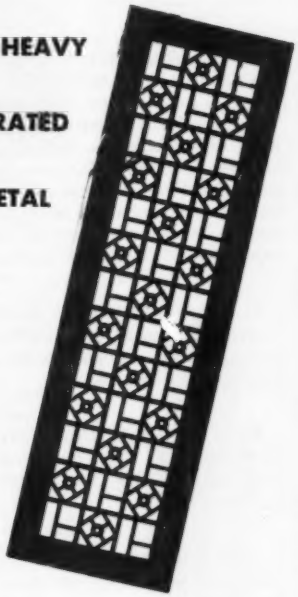
AMERICAN SOCIETY OF REFRIGERATING ENGINEERS, 40 W. 40th St., New York 18 — 48th annual meeting, November 30 to December 3, Hotel Commodore, New York. Symposiums will be conducted on commercial and industrial coil defrosting, insulation and room air conditioners. One session will cover automobile air conditioning. On December 1 the society will hold a joint meeting with the American Society of Mechanical Engineers.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, 29 W. 39th St., New York 18 — Annual meeting, November 30-December 5, Hotels Statler and McAlpin, New York. Seven papers will be presented at a session on Air Pollution Controls. Another important paper to be presented at a session on Power is, "Design Formulas for High-Temperature, High-Pressure Piping." At a Heat Transfer meeting, one of the papers will be, "Mach-Zehnder Interferometer Applications in the Study of Convection and Conduction Heating Transfer Systems." Another of the papers — to be presented at the session on Effect of Temperature on Metals — will be, "Thermal Shock and Other Comparison Tests of Austenitic and Ferritic Steels for Main Steam Piping."

20th NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING — December 1 to 6,

Ornamental Grilles

OF HEAVY PERFORATED METAL



Hendrick Ornamental Grilles are made by perforating metals ranging up to 3/16" in thickness. The designs are clean-cut, without burrs or other imperfections, and the grilles are uniformly flat and easy to install.

Over a hundred designs are available, many of the most distinctive being obtainable only from Hendrick. Each design can be furnished in a wide range of overall dimensions, bar sizes, number of perforations and size of perforations.

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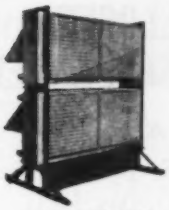
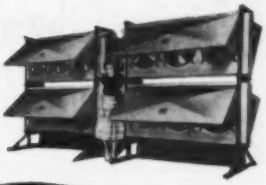


20 TON

40 TON



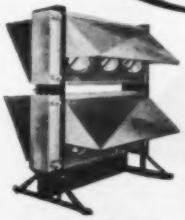
Cut out all **WATER** *problems*

WITH THE

UNICON*

by **KRAMER**

The UNICON eliminates all water problems . . . because it does not require any water. Any size compressor, regardless of tonnage, can be air-cooled with the UNICON by KRAMER. Stands, hood, and wind deflectors are available for simplified outside mounting of this Remote-Type Air-Cooled Condenser.



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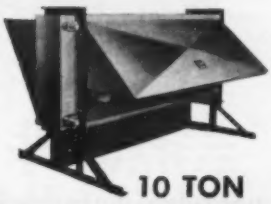
Write to us about your condensing problem.



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KRAMER TRENTON CO.
Trenton 5, N.J.

MEASURE AIR VELOCITY DIRECTLY AND ACCURATELY

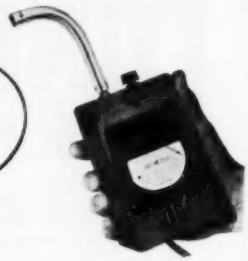
WITH A

HASTINGS AIR-METER

The most sensitive of all air meters for research, industrial and agricultural applications. Reads directly in feet-per-minute on a logarithmic-type scale expanded at lower velocities. Highly sensitive — will indicate the velocity of smoke rising from a cigarette. Response time less than one second. Accurate to within ± 2% regardless of ambient temperature or static pressure.

Uses the exclusive Hastings noble metal thermopile in an extremely stable circuit. Instantaneous range switching without recalibration. Probes available for directional or non-directional reading. Easily adapted for remote recording since the calibration is independent of lead length. Available in several models to meet your specific requirements.

Hastings Model H Air Meter. Compact unit for field and laboratory use. Velocity Ranges: 10-750 fpm; 750-5500 fpm.



Hastings Model G Air-Meter. Small hand type instrument. Velocity range: 0-6000 fpm; Weight: 26 ounces.

Hastings Model B Air Meter for measurements of greatest precision. Velocity ranges: 0-400 fpm; 400 to 6,000 fpm. Meter type continuous calibration check. Knife edge, parallax free indicator.

Write for descriptive literature and prices on Hastings Air Meter, Manometer and Flowmeters, and Vacuum Gauges.

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DESIGNERS AND BUILDERS OF RADIST AND SPECIAL ELECTRONIC, ELECTRICAL, AND MECHANICAL INSTRUMENTS

Grand Central Palace, New York. Management of the show is the International Exposition Co., Grand Central Palace, New York 17. It is held under the auspices of the American Society of Mechanical Engineers, whose annual meeting will be in session during the same week.

NATIONAL WARM AIR HEATING AND AIR CONDITIONING ASSOCIATION, 145 Public Square, Cleveland 14 — 39th annual convention, December 3 and 4, Sheraton Gibson Hotel, Cincinnati.

10th REFRIGERATION AND AIR CONDITIONING EDUCATIONAL EXHIBIT AND CONFERENCE — December 5 to 7, Miami. Sponsored by the Refrigeration Equipment Manufacturers Association, 1346 Connecticut Ave., N.W., Washington 6, D. C. Annual meetings of the Refrigeration Service Engineers Society and the Refrigeration and Air Conditioning Contractors Association will be held in Miami at the same time, followed by a joint meeting of the manufacturers and wholesalers on December 8 and 9, Hollywood Beach, Fla.

PLANT MAINTENANCE CONFERENCE AND SHOW — January 19 to 22, 1953, Public Auditorium, Cleveland. Management of the show is Clapp & Poliak, Inc., 341 Madison Ave., New York 17.

NATIONAL HEATING WHOLESALERS ASSOCIATION, INC., 637 Union Commerce Bldg., Cleveland 14 — The annual meeting, January 26 to 28, Congress Hotel, Chicago.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, 62 Worth St., New York 13 — 59th annual meeting, January 26 to 29, Conrad Hilton Hotel, Chicago. See ASHVE Journal Section for details.

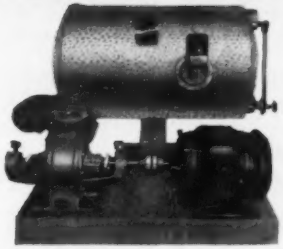
11th INTERNATIONAL HEATING & VENTILATING EXPOSITION — THE AIR CONDITIONING EXPOSITION — January 26 to 30, 1953, International Amphitheatre, Chicago. Held under the auspices of The American Society of Heating and Ventilating Engineers. Address inquiries to the exposition management, International Exposition Co., Inc., Grand Central Palace, New York 17.

NATIONAL ASSOCIATION OF CORROSION ENGINEERS, 1061 M & M Bldg., Houston 2. — Conference and exhibition, March 16 to 20.

AIR POLLUTION CONTROL ASSOCIATION, 4400 Fifth Ave., Mellon Institute Building, Pittsburgh — Annual meeting, May 25 to 28, Lord Baltimore, Baltimore.

AMERICAN WELDING SOCIETY, 33 W. 39th St., New York 18. — National Spring Technical Meeting, June 16 to 19, 1953, Shamrock Hotel, Houston. Includes a four-day Welding and Allied Industry Exposition in the Shamrock Hall of Exhibits.

For EVERY CONDENSATE RETURN JOB



APCO HORIZONTAL UNITS
(Simplex and Duplex)

are used whenever the return comes back above the boiler room floor level. Will not vapor bind or lock. Free running clearance allows for expansion due to heat. Catalogued in sizes from 2,000 to 100,000 sq. ft. E. D. R. Larger sizes available.

BULLETIN H-113

AURORA
***has the* COMPLETE ANSWER**

Complete satisfaction in thousands of installations is YOUR assurance that customer-pleasing Apco and Aurora Condensate Return Units will back you up with profit and good will. Write for descriptive bulletins — then install a few jobs — and BE GLAD YOU DID.

AURORA VERTICAL UNITS
(Simplex and Duplex)

for ECONOMY where returns are too low for horizontal pumps or below floor level. Quiet, smooth, lasting and efficient. Apco Turbine-Type Pumps up to 40 lbs. G. P. M.; Aurora Centrifugal Pumps for larger units. Catalogued in sizes from 2,000 to 100,000 sq. ft. E. D. R. Larger sizes available.

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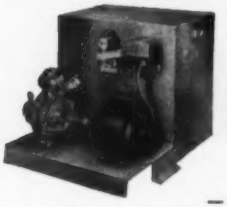

APCO Packaged Square Tank Units for small, low pressure jobs (Simplex and Duplex)

— 10 to 40 lbs. — up to 15,000 rated sq. ft. E. D. R. Equipped with the utterly simple, highly efficient, remarkably trouble-free and lasting Apco Pump. Outstanding values.

BULLETIN 113-ST

PUMPS *"by Aurora"* for MANY PURPOSES

We invite you to acquaint yourself with the wide variety of Pumps "by Aurora." Among them you will find sizes and types for practically all liquids handling duties in Industry — in the Home — on the Farm.

Write for Condensed Catalog or Individual Bulletins

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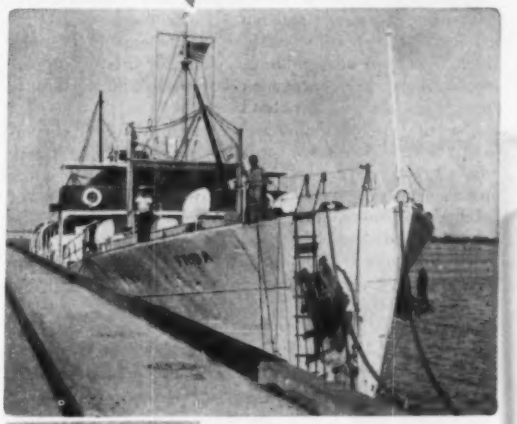
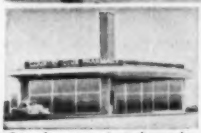
AURORA Always PUMPS

AURORA PUMP COMPANY

80 Loucks St., AURORA, ILLINOIS

THEY SAY: "There's nothing like this Air Conditioning"





One of many modern pharmacies that depend on Ready-Power.

More and more super markets are using Ready-Power.

Ready-Power is ideal for church air conditioning.

The Casa Linda theatre saves many dollars with Ready-Power.

The "Frida," a banana boat plying between Mexico and Houston, Texas is Ready-Power equipped

Wherever used, Ready-Power has met the test of operating efficiency to the full satisfaction of the user.

Ready-Power air conditioning equipment is planned and designed to meet the most exacting requirements with the lowest possible operating costs.

Ready-Power design permits *continuous* operation at varying speeds, which is far superior to "on and off" types. This means that the air conditioning system performs at reduced capacity allowing for a constant dehumidification of the fresh air supply.

The dependable and economical performance of Ready-Power has been proved in hundreds of installations. Names of users will be furnished on request.

READY-POWER
SAVES AS IT SERVES

THE READY-POWER CO.
11231 FREUD AVE. • DETROIT 14, MICH.

Manufacturers of Gas and Diesel Engine Driven Generators and Air Conditioning Units; Gas and Diesel Electric Power Units for Industrial Trucks.

NEW BOOKS & REPORTS

Copper Welding Rod Specifications

The latest specifications for filler metal, issued jointly by the American Welding Society and the American Society for Testing Materials, *Specifications for Copper and Copper-Alloy Welding Rods*, covers their use with oxy-acetylene, carbon arc and inert-gas metal-arc welding.

The 12 classifications established by these specifications include copper, silicon bronze, phosphor bronze, copper-nickel, naval brass, manganese bronze, low-fuming bronze and aluminum bronze welding rods.

As with the other filler metal specifications for copper-alloy electrodes and for steel and aluminum filler metal, these new specifications give the chemical composition, mechanical properties and usability characteristics of each classification, with corresponding tests for verifying these properties.

An appendix is included as an aid to users in selecting the best welding rod for their needs and using it in the most efficient way.

Copies may be obtained at 40 cents each from either the American Welding Society, 33 W. 39th St., New York 18 or the American Society for Testing Materials, 1916 Race St., Philadelphia 3.

Reduction of Dust in Stack Gases

A new "Aid to Industry" publication which shows operators of small stationary plants how to reduce dust in stack gases has been published by Bituminous Coal Research, Inc.

How to Reduce Stack Dust from Small Stationary Plants is the second in a series to help coal users get maximum satisfaction from coal and to help coal producers expand their markets. Particular attention is given to the smaller plants up to approximately 300 hp. Factors influencing the quantity of solids in stack gases are reviewed.

The 12-page, two-color booklet may be obtained from Bituminous Coal Research, Inc., 2609 First National Bank Bldg., Pittsburgh 22, for 40 cents a copy.

OTHER BOOKS AND REPORTS

HANDBOOK ON AIR CLEANING—PARTICULATE REMOVAL published by the Dept. of Industrial Hygiene, School of Public Health, Harvard University and the United States Atomic Energy Commission. Written at the request of the Advisory Stack Gas Problem Working Group, its purpose is to make available to AEC personnel current information on air cleaning methods and criteria for judging their effectiveness. Subjects covered include: behavior of aerosols in air cleaning; air cleaning equipment; performance and evaluation of air cleaning equipment, and special problems involved in the cleaning of radioactive aerosols. The handbook was prepared by Sheldon K. Friedlander, Leslie Silverman, Philip Drinker and Melvin W. First.

It may be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. for 45 cents a copy.

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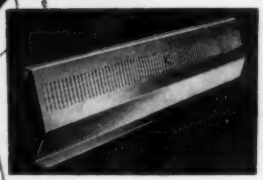

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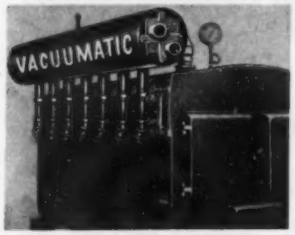

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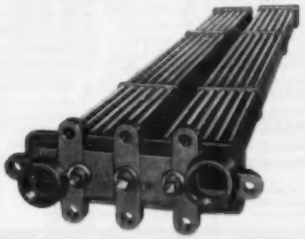

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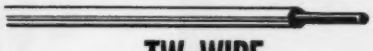

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Air Conditioner

HPAC 101—Catalog AC-504 describes multi-zone air conditioner. Each unit consists of a fan housing, coil section and damper section. Each section may be handled separately and assembled on the job. It is designed to be able to cool one part of a building while heating another part. [Manufacturer: Refrigeration Engineering, Inc., Dept. MZ-5, 7250 E. Slauson Ave., Los Angeles 22.]

Arc Welders

HPAC 102—Eight-page folder illustrates and describes line of gasoline engine driven arc welders. Complete electrical and mechanical specifications are given for the arc welders and combination model of arc welder and power unit. [Manufacturer: Hobart Brothers Co., Hobart Square, Troy 1, Ohio.]

Barometric Draft Control

HPAC 103—Catalog covers barometric draft controls for oil and coal fired heating equipment and gas-fired com-

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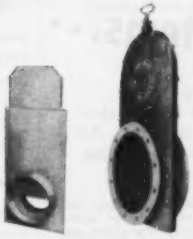

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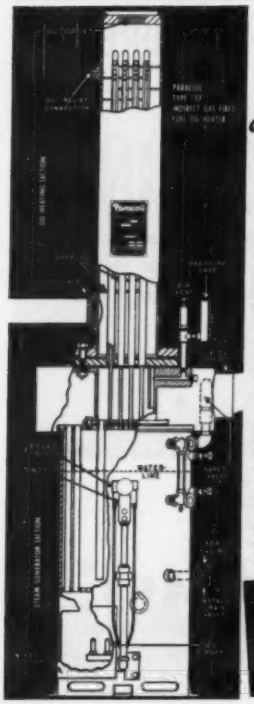

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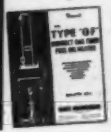

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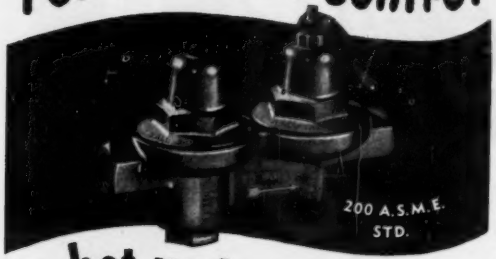

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mercial installations. Descriptions of each control are given including sizes, dimensions and shipping weights. [Manufacturer: Field Control Div., H. D. Conkey & Co., Mendota, Ill.]

Boiler

HPAC 104—Catalog JR-10-1 contains specifications and dimensional data for the "R-Z-U Junior" boiler when fired by oil, gas, stoker and hand-fired coal. Outline drawings for all sizes, ratings for domestic hot water coils and photographs to show the internal design, construction and features are included. [Manufacturer: Fitzgibbons Boiler Co., Inc., 101 Park Ave., New York 17.]

Centrifugal Pumps

HPAC 105—Bulletin, Form 7223, covers general purpose centrifugal pumps of the cradle-mounted type. Five basic cradle groups and 17 corresponding pump types, their capacities, hp ratings and uses are given. There are also tables giving pump dimensions and performance. [Manufacturer: Ingersoll-Rand Co., Dept. CP., 11 Broadway, New York 4.]

Coal Conveyor

HPAC 106—Folder describes "Flo-Tubes" used for conveying coal from pile or bin to hoppers. Diagrammatic drawing shows detailed operation. [Manufacturer: Canton Stoker Corp., Andrew Place S.W., Canton, Ohio.]

Convector-Radiators

HPAC 107—Forty-page illustrated bulletin on convector radiators, specifications, location, choosing the prop-

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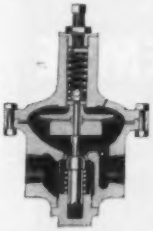

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Cork Specifications

HPAC 108—Revised bulletin on the structure of cork, natural cork products, cork compositions, physical characteristics and typical products. Included is tabular data on density, tensile strength, compression and coefficient of friction of natural cork. The bulletin also gives physical properties, characteristics and uses, sheet sizes, and thicknesses of cork compositions. [Manufacturer: Dodge Cork Co., Inc., Lancaster 19, Pa.]

Damper Regulators

HPAC 109—Catalog 52 describes direct and remote damper controls and relief and multi-blade dampers. Each type is illustrated and specifications are included. [Manufacturer: Young Regulator Co., 5209 Euclid Ave., Cleveland 3.]

Electronic Recorder

HPAC 110—Bulletin A-704 describes "Autronic" recorder, miniature all-electronic recorder designed to give a true linear trace. Bulletin is illustrated with photographs and schematic diagrams showing principles of operation, and dimensional sketches. [Manufacturer: The Swartwout Co., 18511 Euclid Ave., Cleveland 12.]

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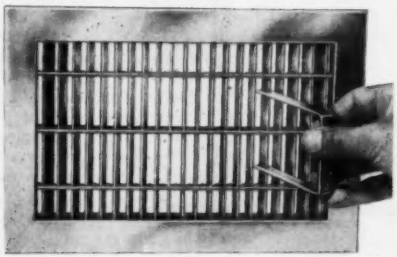

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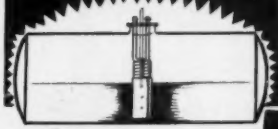

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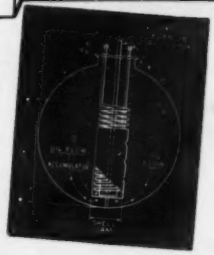

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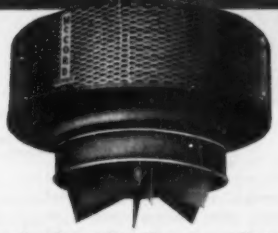

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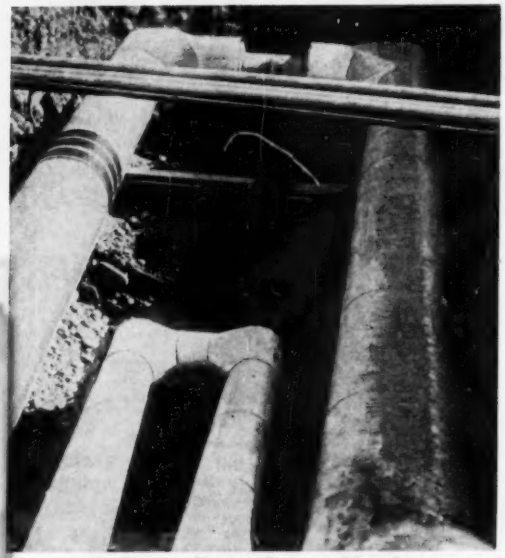

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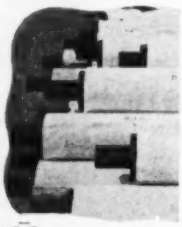

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Expansion Joints

HPAC 111—Sixteen-page, illustrated catalog featuring specification and supporting data on "Flexon" expansion joints. Also covered is complete specification and application information on corrugated and convoluted types of flexible metal hose, including couplings, flanges, nipples and assemblies. Installation instructions are given. [Manufacturer: Flexonics Corp., 1396 S. Third Ave., Maywood, Ill.]

Exhaust Units

HPAC 112—Fan Catalog F-52 contains information on heavy duty exhaust unit, how to select a unit and applications. Also described are window mount units, duct mounted units, roof ventilators, automatic shutters and exhaust piping. [Manufacturer: M & E Mfg. Co., 2571 Winthrop Ave., Indianpolis.]

Frame Type Centrifugal Pumps

HPAC 113—Bulletin 52B6691A describes pumps designed to handle capacities up to 500 gpm and heads as high as 135 ft. Cross section diagrams of the three available types and several performance curves are included. [Manufacturer: Allis-Chalmers Mfg. Co., 1171 S. 70th St., Milwaukee.]

Gas Heaters

HPAC 114—Catalog GN-52 gives detailed description of operation of gas heaters, including suspended unit heaters of the propeller and blower types, room heaters, central heaters and duct furnaces. Specifications and dimensions

WHY WASTE WIND POWER:

A assured performance
B bearings—guaranteed
C cost—low
D delivery—immediate

The *WESTERN ROTARY* ventilator continues to exhaust during wind lulls by kinetic energy.

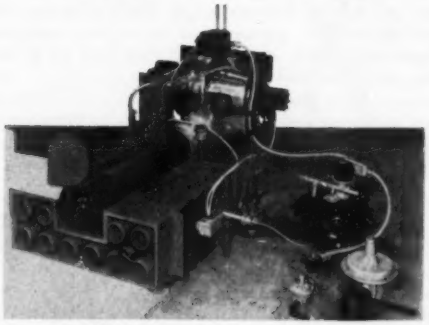
Lifetime guaranteed bearings—bearings that stay in alignment. Both bearings mounted on same axis. Long-lasting metallic-leafing paint finish on durable galvanized steel. Clean, low modern silhouette, completely functional. Throat sizes 6" thru 48" . . .Order today from your wholesaler. Write for prices, specifications, other information. In 1952 Sweet's, A.E.C., Heating, Ventilating & Air Conditioning Guide.

"always on the job—never on the payroll"

WESTERN ENGINEERING & MFG. CO.
4118 OCEAN PARK AVENUE, VENICE, CALIFORNIA

WEBSTER DUONETIC*

for Dual Fuel Firing



The WEBSTER DUONETIC* now offers unsurpassed economy, efficiency and trouble-free operation in the combination oil and gas firing equipment field. Never before have both fuels been burned so well so simply.

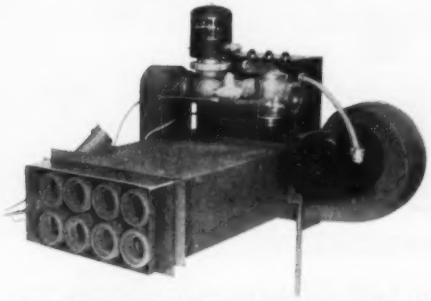
You can rely on the usual WEBSTER quality to provide you with the best.

Both burners employ electric ignition; constant electric ignition on the oil burner, and electric ignition for the gas burner safety pilot.

WEBSTER DYNETIC*

Forced Draft

GAS BURNER



The WEBSTER DYNETIC Gas Burner consists of multiple venturi tubes with heat resistant alloy, flame retention nozzles assembled in a metal housing and equipped with an electrically driven blower to furnish all of the air for combustion.

All of the valves and controls required for safe, automatic operation, except for thermostat and limit controls, are incorporated in the assembly and wired and tested at the factory. The motor driving the blower is equipped with a centrifugal switch to prevent main gas valve operation unless the blower is functioning.

The burner is available in six sizes for natural gas.

*TRADEMARK

The WEBSTER ENGINEERING COMPANY
TULSA, OKLAHOMA
Division of SURFACE COMBUSTION CORPORATION, Toledo, Ohio

Five of the Clarage Heavy Duty Fans in the air conditioning systems of The Upjohn Company's new plant in Kalamazoo. Korfund Twin Rail Fan and Motor bases were used to prevent vibration and noise transmission into the supporting steel deck and the duct work.

. . . by installing over 200 fans and motors on Duplex bases

Upjohn has long been known for extreme care in the production of fine pharmaceuticals. Therefore, in building their new plant, quiet, spotless working conditions were a prime consideration. This called for 120 complete air conditioning systems with 324 Clarage Heavy Duty fans.

To conserve floor space, The Austin Company, Engineers and Builders planned the installation on suspended platforms and structural steel members under the roof.

Korfund Twin Rail Bases were specified so that no vibration or noise could reach the working areas through the steel decks or through the ducts, and to simplify the installation.

Complete adjustability of the Duplex Twin Rail separate bases for fan and motor made it easy to take care of variations in drive center distances, motor positions and other variables; and the exclusive built-in chocks in these bases guaranteed permanent alignment.

For installation of fans, pumps, compressors, refrigerating and other types of mechanical equipment for both normal and critical operating conditions, basic isolation recommendations are given in Korfund Bulletin G-104. See Sweet's Catalog Files, or write for your free copy today.

If you have a problem, we will be glad to submit recommendations without obligation. A half century of experience is at your disposal. Representatives in principal cities.

THE KORFUND COMPANY, INC.

KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

41-01F Thirty Second Place, Long Island City 1, N. Y.
In Canada: 510 Canal Bank, Ville St. Pierre, Montreal

See us at the International Heating and Ventilating Exposition, Chicago, January 26-30. Booth No. 943.

SAVE with
fuel...time...money
Fuelguard
HEAVY DUTY
DAMPER REGULATOR

IT'S SAFER... BETTER LOOKING... MORE ECONOMICAL... DOES A BETTER JOB

Easy-to-install FUELGUARD helps prevent fuel waste by making possible precision-adjustments (for control of drafts in medium to large boilers). Universally adaptable to all installations (manual or automatic controls). Let FUELGUARD "go to work for you."

Damper - positioner Quadrant with lubricated bearings, indicating scale, locking device.

For full details write to Ashcraft

Fuelguard
5643 Dyer St. - Dallas

are given. [Manufacturer: Reznor Mfg. Co., Mercer 8, Pa.]

Gate Valves

HPAC 115—Catalog 12-E describes new line of cast steel gate valves. Information on details of design, material specifications, pressure and temperature ratings and dimensional details and weights is included. Features of gate valves described include close fitting guide ribs which prevent wedge drag on seat faces, one-piece bonnets for stem alignment and ball bearing yokes. [Manufacturer: Edward Valves, Inc., 1200 W. 145th St., East Chicago, Ind.]

Heat Treating and Process Piping Equipment

HPAC 116—Catalog 52 contains illustrations and descriptions of light-weight processing and heat treating equipment, including alloy process piping. Sizes and uses of each of the products are included. [Manufacturer: The Pressed Steel Co., Wilkes-Barre, Pa.]

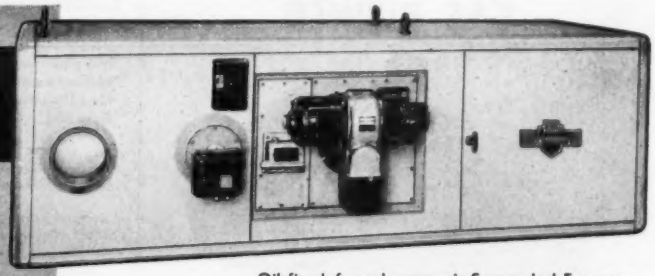
Humidity Information

HPAC 117—Bulletin, "A Few Facts About Humidification," covers discussion of relative humidity, and problems of relative humidity. Also described are various models of humidifiers and indicating instruments. Special bulletins for specific industries are available. [Manufacturer: Abbeon Supply Co., 179 Jamaica Ave., Jamaica, N.Y.]

Ice Skating Rinks

HPAC 118—Bulletin 198-E, "Ice and Frost," describes

for UNUSUAL INSTALLATIONS



Oil-fired, forced warm air Suspended Furnace

THE Waterbury Suspended FURNACE

With floor space at a premium, a special heating unit is a definite need. Waterbury successfully meets this need with the Suspended Furnace—the newest addition to the Waterbury line.

Commercial buildings, industrial plants, and certain homes require a suspended warm air heating unit to conserve valuable floor space. A "package" unit, assembled at the factory, the Waterbury suspended furnace has all parts readily accessible from the front, for easy inspection, cleaning, and servicing. Air filters and a large capacity blower are standard equipment in this space-saver, which can be suspended in a crawl space under the floor, from the basement ceiling, in the attic, or in any portion of a building where more space is available at ceiling level than on the floor.

Waterbury manufactures a complete line of furnaces and winter air conditioners, with a unit for every size home and every type of fuel.

The Waterman-Waterbury Co.
OVER 45 YEARS OF WARM AIR HEATING
1152 Jackson St. N. E. Minneapolis 13, Minnesota

Any engineer will tell you **Skidmore** offers more pump performance

There's a wide range of types and capacities for every heating pump need. Let Skidmore advise you on your next tough job.

TYPE UV

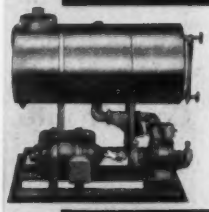
Type UV Condensation Pump is designed for below floor level returns, and is built in single and duplex units.

Write for *Bulletin No. 19-A*

TYPE HS

Type HS Pump is recognized for its dependable low operating cost. Capacities range from 1,000 to 65,000 sq. ft. EDR and pressures from 10 to 75 pounds.

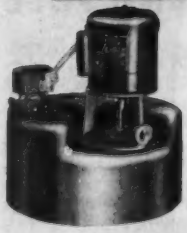
Write for *Bulletin No. 14-A*



TYPE TM

Type TM High Pressure Turbine Pump. Designed for pressures up to 150 pounds and boilers to 250 H.P.

Write for *Bulletin No. 17*



TYPE CV

Type CV Vertical Pump is ideal where space is limited. This model like every Skidmore Pump is built to meet specific requirements. For the correct solution to your own pump problem consult a Skidmore Heating Pump Specialist.

Write for *Bulletin No. 21*

Sales representatives in principal cities

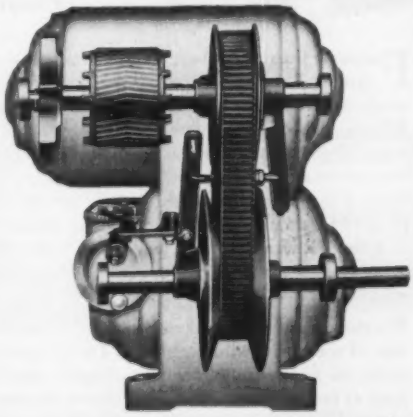
SKIDMORE CORP., ST. JOSEPH, MICHIGAN

SKIDMORE PUMPS

Speed-Trol Solves Air Volume Control Problems

Speed-Trols with remote controls and speed indicators solve, better than anything we have ever found, the problem of proper air volume control in heating and air conditioning equipment we design and install... remote controlled Speed-Trols provide infinite speed adjustment, positive speed regulation, compactness, quiet operation and efficient service... with them, we accurately control air volume from any location to meet variation in weather and occupancy load, reports A. H. Berg of A. H. Berg & Sons, Wilmar, Calif.

STERLING SPEED-TROL



OUTSTANDING FEATURES FOR BETTER AIR CONDITIONING:

Infinite speeds—positive speed regulation—fingertip control—large indicator—positive pulleys—no springs—belt tension in proportion to load—protected—streamlined—Herringbone Rotor—through ventilation—versatile mounting—NEMA dimensions—shock absorbing—quiet operation—rugged—compact—dependable—long life.

WRITE FOR BULLETIN NO. FQ-112

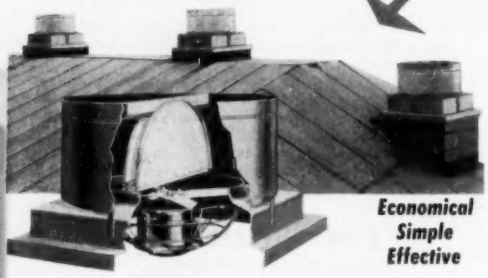
STERLING ELECTRIC MOTORS

Plants: New York City 51; Van Wert, Ohio; Los Angeles 22; Hamilton, Canada; Santiago, Chile
Offices and distributors in all principal cities

Handle Hundreds of ventilation problems with the powerful Swartwout

Whirlout

"Straight-through" roof ventilator



Economical
Simple
Effective

For many situations where fast powerful exhaust is desired above furnaces, ovens, pickling vats, or any operation that creates heat, smoke or fumes, Whirlout throws out unwanted elements in a hurry. The circular body forms a chute directing the airflow straight up, to be dispersed by air currents. There's practically no air friction created except by the center dampers, which are necessary to make the ventilator weather proof when not operating. (Weather is kept out by the blast of air when fan is operating.)

Whirlout provides economical, effective ventilation of the straight-through type. The air stream opens the two half-disc dampers — holds them as long as power is on. Fan action carries contaminants high above the building.

Design and construction is simple and sturdy. Airplane type fan is driven by an efficient ball bearing motor. Whirlout is made in 10 sizes (16″ to 60″), with a wide selection of capacities available. Install or recommend Whirlout for ventilation situations such as you find in —

foundries	paper mills
forge shops	glue factories
canneries	steel mills
heat treating plants	process plants
potteries	welding rooms
glass plants	paint shops

— and many others. Write for Bulletin 346F.

18511 Euclid Avenue, Cleveland 12, Ohio

The Swartwout Co.

Roof Ventilators and Ventilating Louvers

POWER PLANT EQUIPMENT • PROCESS INDUSTRY CONTROLS

and illustrates the methods used in preparing some of the largest indoor and outdoor skating rinks in the country. [Manufacturer: Frick Co., Waynesboro, Pa.]

Industrial Waste

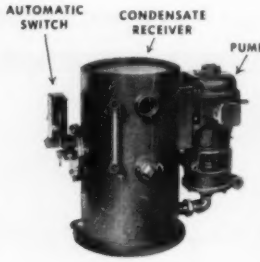
HPAC 119—Bulletin B-I-F No. 4, "Industrial Waste Treatment Guide," contains a table showing the different types or combinations of unit treatment processes for more than 50 wastes. Another table shows the equipment used in the several unit treatment processes. Also shown is the equipment available. The bulletin contains a two-page spread flow diagram showing how the various treatment processes and equipment may be combined to treat mixed wastes. [Manufacturer: Builders Iron Foundry, Inc., 345 Harris Ave., Providence, R.I.]

Insulation Specifications

HPAC 120—Revised brochure explains the thermal and acoustical qualities of "Ultralite" duct insulation. When to use the insulation and in what densities and thicknesses and procedures are discussed. A section is devoted to accessory materials used to apply the insulation. [Manufacturer: Gustin-Bacon Mfg. Co. 210 W. 10th St., Kansas City 6, Mo.]

Insulation Surfacing

HPAC 121—Index to specifications for recommended surfacing for industrial insulations. Code letters show at a glance the proper specification for a surfacing problem. Available by request on business letterhead. [Manufacturer: Benjamin Foster Co., 4631 W. Girard Ave., Philadelphia 31.]



GOULDS

Condensate Return Unit

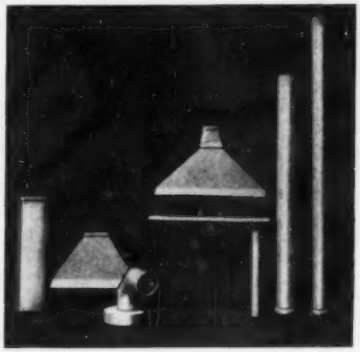
SAVES HEAT AND FUEL

This compact Goulds unit improves heating efficiency and cuts fuel bills by automatically returning hot condensate to the boiler from steam radiators, steam jacketed kettles, pipe coils, evaporators and other steam-heating equipment. Correct size of receiving tank prevents serious effect on boiler water level. Automatic float switch starts and stops pump according to water level in receiver. Provision can be made for automatic feed-water make-up with boiler level control. Bulletin 661.A1 gives complete details. Phone your Goulds dealer for a copy today, or write us direct.

Goulds PUMPS INC.

Seneca Falls
New York

FOR MAXIMUM PROTECTION
From Corrosive Fumes and Liquids



Typical Heil Solid Plastic Duct Sections Ready to Install

RIGIDON SOLID PLASTIC EXHAUST HOOD AND DUCT SECTIONS FOR ACID FUME SERVICE

Use Rigidon Solid Plastic Hoods & Ducts

- Excellent Chemical Resistance
- Low Initial Cost
- Light Weight and Maximum Strength
- Wide Variety of Standard Designs

For Your Lined Pipe Requirements

Steel Pipe Lined with Neoprene Rubber for Temperature and Corrosion Resistance.

WRITE TODAY FOR ILLUSTRATED BULLETINS NO. 751 and NO. 754 ON SOLID PLASTIC

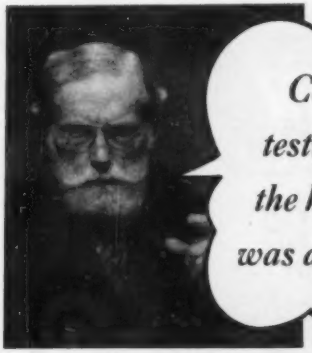
You are assured longer service life and less maintenance cost by our expert workmanship and unbiased selection of the best lining materials for your specific requirements.

Sales Representatives in All Principal Cities

HEIL PROCESS EQUIPMENT CORP.

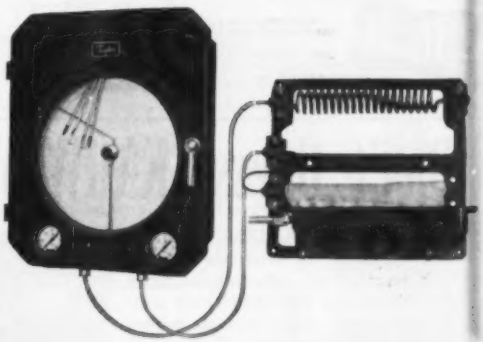
12901 ELMWOOD AVE. CLEVELAND, OHIO

Other Heil Products Include: Impervious Graphite Heating and Cooling Units • Lined Storage and Process Tanks • Acid-proof Maintenance Materials • Structural Plastics • Steam Jet Agitators • Lead Fabrication



Can you testify what the humidity was at 4 a.m.?

THERE are times when an accurate record of the humidity can save a lot of time and money—and headaches too. Taylor makes a full line of recording, recording-controlling and indicating instruments for every air conditioning need. We'll be glad to work with you or your consulting engineers or contractors to give you the instruments best suited to your individual problem. Ask your Taylor Field Engineer, or write Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.



RECORDING OR RECORDING-CONTROLLING HYGROMETER with bottle or continuous water feed. Model shown is recommended where panel can be advantageously located within apparatus room or duct for best circulation across the bulbs. Motor-driven-fan models may be installed inside or outside of room! Available with bottle-feed or continuous water supply.

TAYLOR 108G HYGROMETER. With bottle-fed reservoir; or continuous feed, as specified. Combines accuracy of an etched stem thermometer with ruggedness of an industrial thermometer. Easier-to-read. Perfect for accurate spot checks on jobs like **air conditioning supply and return ducts, dryers, and other closed compartments.**

Instruments for indicating, recording and controlling temperature, pressure, flow, liquid level, speed, density, load and humidity.

TAYLOR INSTRUMENTS MEAN ACCURACY FIRST

MOISTURE'S NO PROBLEM
MUCKLE VENTS
chase out foul, wet air!
• Good looking
• Fit any roof
• Easy to install
• Motor out of line of air flow — for better performance in moisture filled air
Muckle
WRITE TODAY FOR COMPLETE INFORMATION
SOME TERRITORIES OPEN FOR SALES REPRESENTATIVES
MANUFACTURING CO. OWATONNA 8, MINN.

Motor Drives

HPAC 122—Four-page bulletin describing a-c and d-c motors, adjustable-speed drives, electronic controls and regulators, motor-generator sets, generators and regulators. Functions of each product and service applications are indicated and representative units are illustrated. [Manufacturer: Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland 10.]

Oil, Gas or Stoker Boiler

HPAC 123—Catalog 88 contains description of features of "Square-Heat" boiler for oil, gas or stoker and includes four new larger sizes. Detailed listing of ratings, dimensions, equipment and trims is included. Copies are available from branch offices or by writing directly to the main advertising department. [Manufacturer: Kewanee-Ross Corp., Franklin St. and "Q" Tracks, Kewanee, Ill.]

Pneumatic Controller

HPAC 124—Catalog C-50 describes "P-4 Pneumatrol," controller for rate of flow, differential pressure, liquid level, viscosity, pressure and temperature applications. [Manufacturer: Fischer & Porter Co., 6890 Jacksonville Rd., Harboro, Pa.]

Portable pH Meter

HPAC 125—Bulletin 118 describes portable pH meter, Model 125, powered by three ordinary radio batteries and giving 2000 hours of service. Complete dimensions and specifications are given. [Manufacturer: Photovolt Corp., 95 Madison Ave., New York 16.]

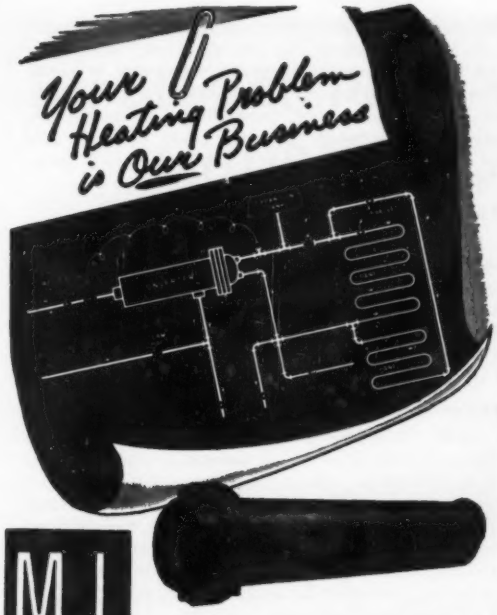
Don't Guess! KNOW WHEN WATER is HARD

Refinite's "HYDRAMIZER" tests the water regularly to determine whether it is actually soft. As soon as water turns hard, the HYDRAMIZER notifies operator. Also used to initiate automatic regeneration. Savings result from soft water assured by Refinite's HYDRAMIZER. . . The "Hydramizer" takes a sample of the softener effluent and positively indicates if the water is still soft or if it has turned hard. . . The "Hydramizer" is also flexible. It can be used to initiate automatic regeneration, or it can warn the operator of a selective automatic or a manually controlled softener that regeneration is required. . . It is easy to see that the "Hydramizer" is much more efficient than the old method of using a meter to indicate the end of the softener run. On waters of varying hardness, this is especially true since the operator must calculate the gallonage capacity of the softener each time the hardness changes.

Get all the facts now — direct your inquiry to

THE REFINITE CORPORATION

P.O. Box 1312 Omaha, Nebraska



M&L ...Traditionally
the right equipment for
every Water Heating purpose

When your plans include heating water with live or exhaust steam—when they call for hot water supply to radiant heating panels or other hot water systems—then use M & L equipment.

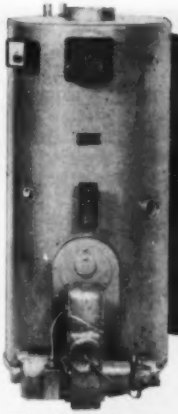
There are many reasons why M & L equipment is traditionally selected for dependable, uninterrupted service—one of which is the extreme care exercised in assembling, to insure longer service life.

Standardized Flexibility

The unique M & L method of fabrication, which permits custom-built equipment to be made from standardized components at a substantial saving in first cost—fits the equipment to the job to be done.

Send for more details on this worthwhile economy. Please include complete operating conditions in your inquiry to receive an accurate, individual proposal.

Manning & Lewis
Engineering Co.
32 Ogden Street Newark 4, New Jersey
SALES REPRESENTATIVES IN PRINCIPAL CITIES



THE NEW ALDRICH Gulf Stream C-SERIES BOILER-BURNERS

Designed, Sized, Rated and Priced For Today's Low-Cost Housing Market

Aldrich produced this new line to meet today's urgent need: quality boiler-burners at a quantity price. Here is compact hot water heating with a saving of dollars, critical materials, space and installation time.

They meet the ASME code; they are designed for standardized production. Five separate sizes, with SBI net ratings ranging from 440 to 1120 square feet of water radiation.

Investigate this new line today. You'll find it profitable to sell, easy to install, economical to use.

The Gulf Stream STANDARD
Shipped fully erected, with complete set of automatic controls: stack switch, thermostat and limit control.

HOT WATER HEATERS
Available as internally galvanized, high-delivery hot water heater. Five sizes, with output from 100 to 255 GPH at 100° rise. Instant, steady supply of hot water for larger homes, motels, commercial units.

The Gulf Stream PACKAGE
Fully erected package, pre-wired, accessory equipped, ready to set in place and connect.

FEATURES

- Multiple flue tubes baffled for maximum heat extraction
- High combustion efficiency
- Fast action
- Instant hot water from tankless hot water coil
- Aldrich burners coordinated to Gulf Stream boilers
- For inspection and maintenance—readily removable top jacket and large opening to combustion chamber
- Burners U.L. listed

For full details, **write or wire**

ANOTHER BREEZE MARK PRODUCT

ALDRICH COMPANY
105 East Williams Street, Wyoming, Illinois

QUICKLY BEND COLD PIPE

IN SIZES UP TO 5" WITH THE

BIG, RUGGED GREENLEE BENDER

Built for the tough jobs, the GREENLEE Hydraulic Bender saves hours, cuts costs on your piping work . . . smoothly bends *all sizes of pipe up to 5"*. With the GREENLEE *one man* quickly makes accurate bends "right on the job" exactly where and when needed! Many owners report labor savings of 50% and more . . . and the cost of many manufactured bends and fittings is completely eliminated. Compact, portable, versatile . . . use the same unit with attachments for making radiant heating return bends. Reduce costs, speed jobs with the GREENLEE which often pays for itself on the very first job. Get facts today.

TOOLS FOR CRAFTSMEN

GREENLEE

Greenlee timesaving tools for plumbing and heating work . . . Hydraulic Pipe Benders Tubing Benders • Hydraulic Pipe Pushers • Pipe Bits • Auger Bits • Spiral Screw Drivers Chisels and Many More. Write for details. Greenlee Tool Co. 2351 Twelfth St., Rockford, Ill.

Pressure-Sensitive Tape

HPAC 126—Bulletin No. 501, describes "Spring-Felt" tape for permanent or temporary attachment to metal, glass, wood or ceramics. It is used to seal against dust, air, fumes and moisture, resists flame, oil, fungus and mildew. Types, colors, thicknesses, uses and stock sizes are included. [Manufacturer: Spring Packing Corp., Dept. 104, 332 S. Michigan Ave., Chicago.]

Pumps and Other Products

HPAC 127—"A Lot of Things Besides Pumps," is a booklet describing the company's complete line. Written and illustrated by cartoonist-author Don Herold, it is both humorous and informative. He takes the various products one-by-one and tells what they do and how they work. [Manufacturer: Worthington Pump & Machinery Corp., Harrison and Worthington Sts., Harrison, N.J.]

Radiator Heating

HPAC 128—Catalog R52 gives full ratings, technical data and dimensions of all radiator heating equipment made by the firm. Liberally illustrated with portrait and cut-away views of products and dimensional drawings. The five sections cover boilers, convectors, radiators, conversion burners, water heaters, controls and accessories and application and installation of the equipment. [Manufacturer: American Radiator & Standard Sanitary Corp. P.O. Box 1226, Pittsburgh 30.]

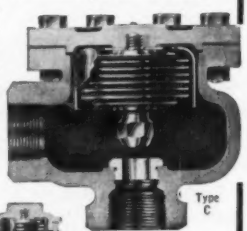
Research Aids

HPAC 129—Bulletin 12-K describes new and improved

NICHOLSON TRAPS

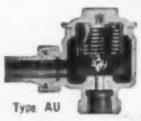
STOP TEMPERATURE FLUCTUATION LOSS

The unusual effectiveness of Nicholson traps in discharging air as well as condensate was again proved recently by a large maker of molded products. Costly temperature fluctuation of the presses was eliminated by Nicholsons. Also widely used for such critical applications as jacketed kettles. 5 types; for process, heat, power; sizes ¼" to 2"; press. to 250 lbs.



Type C

Type AHV



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W. H. NICHOLSON & CO.

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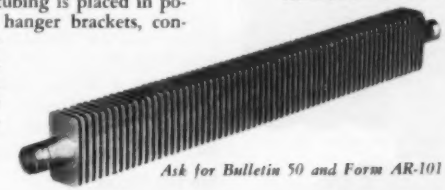

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products such as 3 burner torches, gas-air mixers, improved blow torches, compound vacuum pumps and recording counters for research work. [Manufacturer: Research Vacuum Supply Co., 3434 Montrose Ave., Chicago 18.]

Rheostats

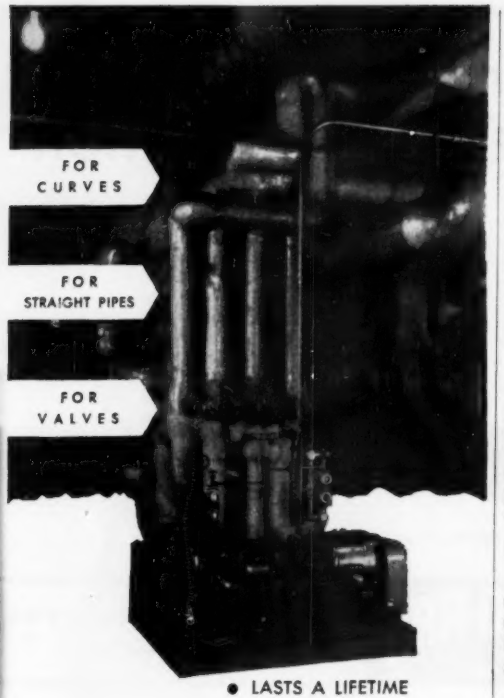
HPAC 130—Bulletin 1110, 25 and 50 watt vitrohm ring type rheostats. Bulletin includes special features of the rheostat, applications, construction details, watt ratings, resistance tolerance, mounting and ordering information. Photos and diagrams are shown. [Manufacturer: Ward Leonard Electric Co., 115 Mac Questen Parkway South, Mount Vernon, N.Y.]

Speed Reducers

HPAC 131—Bulletin A-614-A offers engineering information and selection data on "Torque-Arm Speed Reducers" and the "Overload Release." All data and tables have been revised to cover the new Size No. 7 reducer, which has a 43 hp capacity. Also included are cross section views and engineering diagrams showing proper positioning for installation. [Manufacturer: Dodge Mfg. Co., 500 S. Union St., Mishawaka, Ind.]

Steam Traps

HPAC 132—Bulletin 213 is a condensed catalog on steam and air traps containing a sequence of diagrams explaining the operating principle and design features of inverted bucket traps. Physical data is given on cast semi-steel traps, forged steel steam traps and ball float air



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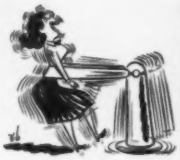

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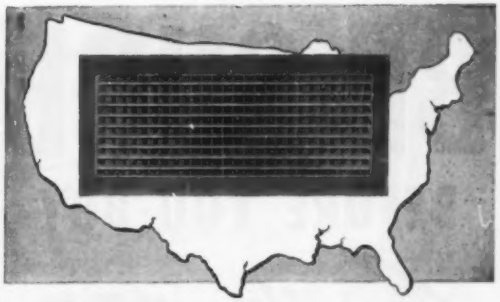

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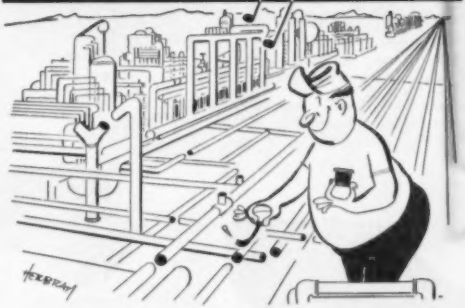

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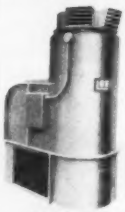

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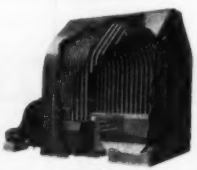

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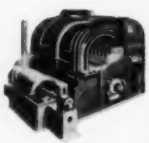

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and air relief traps. A capacity chart shows continuous discharge capacities for all sizes of traps at various pressures. [Manufacturer: Armstrong Machine Works, 213 Maple St., Three Rivers, Mich.]

Steam Vacuum Refrigeration

HPAC 133—Bulletin 60 A covers the range of operation and type of service for which steam vacuum is best suited. Included are two detailed diagrams, in four colors, showing the surface condenser type and the barometric condenser type. [Manufacturer: Graham Mfg. Co., 415 Lexington Ave., New York 17.]

Tubing Steels

HPAC 134—Technical Data Card 143 discusses stainless tubing steel with technical information on corrosion resistance, mechanical properties, forging, machining, welding, heat treatment and physical properties. [Manufacturer: Tubular Products Div., Babcock & Wilcox Co., Beaver Falls, Pa.]

Unit Heaters

HPAC 135—Bulletin 3570, 48-page booklet describes both vertical and horizontal shaft "Herman Nelson" unit heater. Descriptions of component parts and dimensions for both style heaters, expanded steam and hot water capacities are included. One section is devoted to the selection and application of both types. Another section shows motor controls with typical wiring diagrams. A third part shows piping illustrations and installation suggestions for both steam and hot water. [Manufacturer: American

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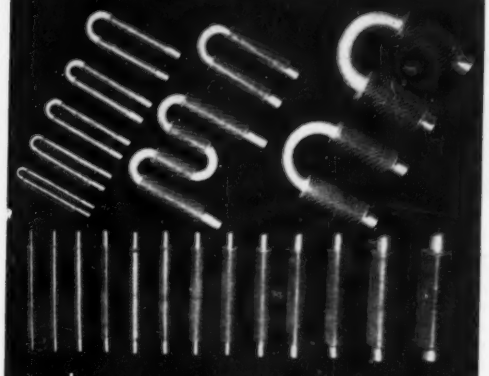

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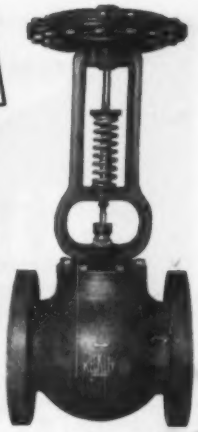

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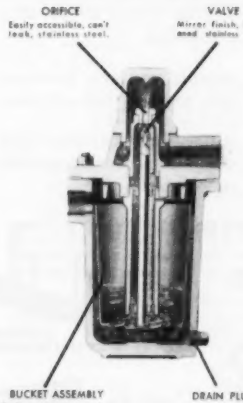

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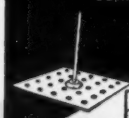

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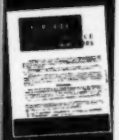

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Unit Heater Layout

HPAC 136—Catalog contains data on heater location, various types of unit heater wiring diagrams, steam pipe sizes, capacity data and technical information for making a unit heater layout. Each type of unit heater is illustrated. [Manufacturer: United States Radiator Corp., 300 Buhl Bldg., Detroit 26.]

Vacuum and Steam Traps

HPAC 137—Illustrated brochure, "Vacuum isn't Vacuum to a Steam Trap," discusses what a vacuum is, how it affects trap operations and causes of a lack of vacuum. The text is illustrated with diagrams, charts and examples. [Manufacturer: Armstrong Machine Works, 874 Maple St., Three Rivers, Mich.]

Vertical Motor Design

HPAC 138—Bulletin on "Verticlosed" motors illustrates developments in vertical motor design in deep well turbine pumps. Engineering data includes discussions of tandem bearing, dual balancing of rotors and the complete motor assembly, use of automatic backstops and so on. [Manufacturer: U.S. Electrical Motors, Inc., Box 2058, Los Angeles 54.]

Water Conditioning and Analysis

HPAC 139—Two technical bulletins. The first, on boiler water conditioning, outlines the difficulties caused through industrial water contamination, recommended

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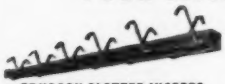

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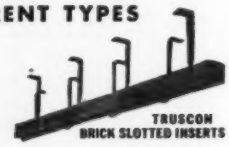

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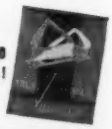

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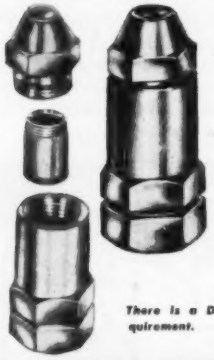

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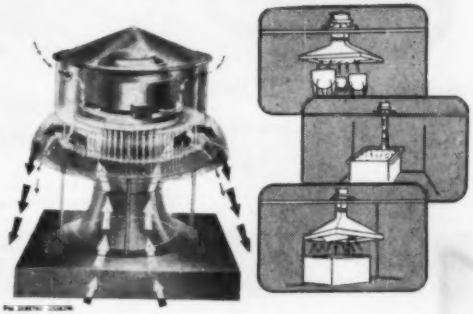

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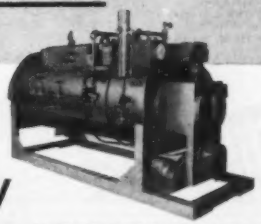

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water conditioning treatments for scale, sludge, corrosion, carryover, and control methods. Second booklet, on Industrial Water Analysis, covers boiler water sampling, expressions of results, test equipment and general water analysis. The second book costs $1.00. [Manufacturer: E. F. Drew & Co., Inc., 15 E. 26th St., New York 10.]

Water Softeners

HPAC 140—Bulletin 2386 discusses troubles caused by the utilization of hard water and the multiple economies effected by curing them. It also explains the three basic types of ion-exchange equipment and shows how these units can be profitably utilized. [Manufacturer: Permutit Co., 330 W. 42nd St., New York 36.]

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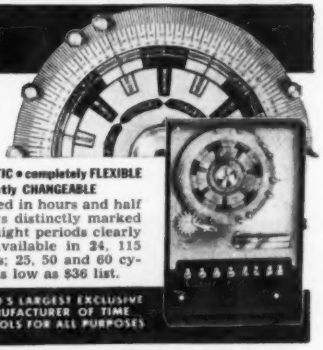

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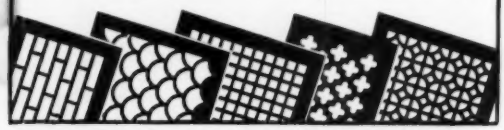

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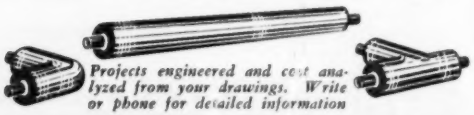

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Statement of Ownership and Management of

HEATING, PIPING & AIR CONDITIONING

for October 1, 1952

The following is a statement of ownership, management, etc., as required by the act of Congress of August 24, 1912, as amended by the acts of March 3, 1933 and July 2, 1946 (Title 39, United States Code, Section 233) of Heating, Piping & Air Conditioning, published monthly at Chicago, Ill., for October 1, 1952:

1. The names and addresses of the publisher, editor, managing editor, and business manager are:

Publisher, F. P. Keeney, Chicago, Illinois.
Editor, C. M. Burnam, Jr., Chicago, Illinois.
Managing Editor, C. M. Burnam, Jr., Chicago, Illinois.
Business Manager, Chas. E. Price, Chicago, Illinois.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given.)

Keeney Publishing Company, 6 North Michigan Avenue, Chicago 2, Illinois. Stockholders: F. P. Keeney, Chicago, Illinois; W. J. Osborn, Fairfield, Conn.; Chas. E. Price, Chicago, Illinois; Robert A. Jack, Cleveland Heights, Ohio.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

Chas. E. Price, Business Manager.

Sworn to and subscribed before me this 15th day of September, 1952

Grace E. Waymire.

(SEAL) [My commission expires February 10, 1954]

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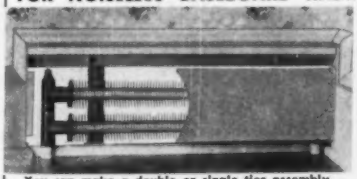

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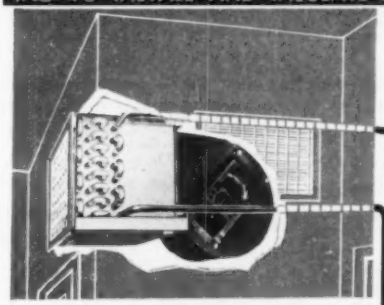

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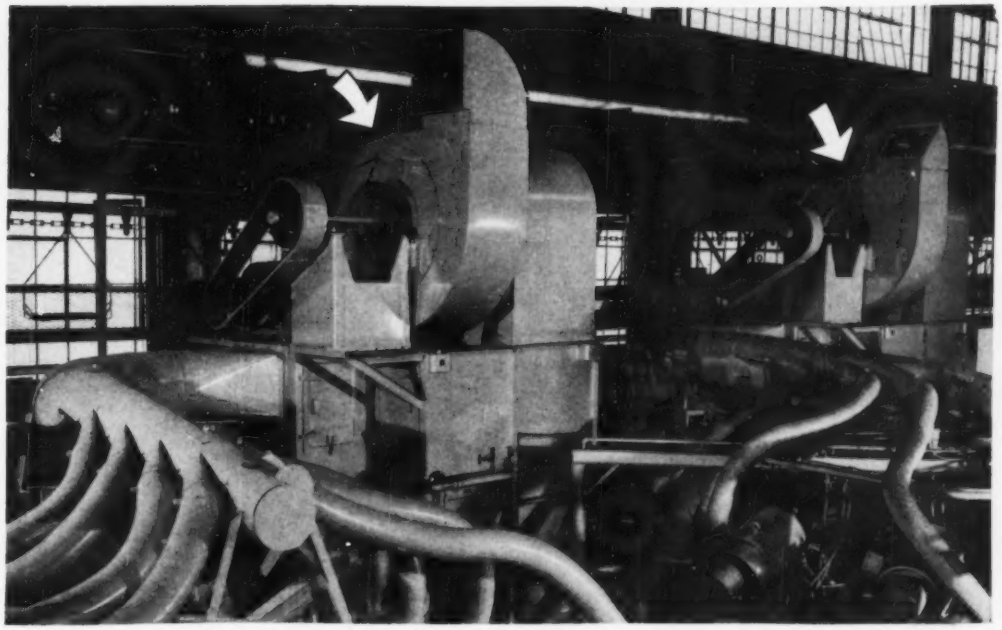

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how Johnson temperature control

Automatically attracts store traffic

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Scruggs-Vandervoort-Barney, Inc., is prominent on the growing roster of leading department stores that depend on modern Johnson Automatic Temperature and Air Conditioning Control to provide the ultimate in customer comfort.

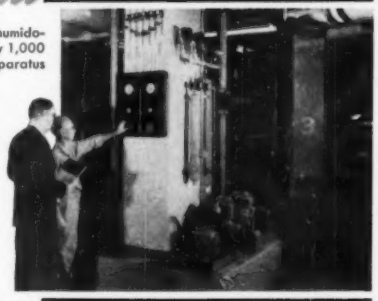
With Johnson Control in command, heating, ventilating and cooling are under complete and precise control at all times. As patrons move from floor to floor or from section to section, uniform temperatures assure the best possible shopping atmosphere. When conditions demand, it is perfectly possible to cool a crowded interior section while perimeter areas of the same floor are being heated.

This accuracy and flexibility are typical of "Planned-for-the-Purpose" Johnson Control because each Johnson system *is specifically designed to meet the needs of the individual control problem.* That is why you will find Johnson Control not only in outstanding department stores, but in every other kind of public, business and industrial building.

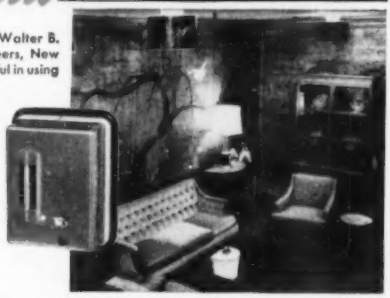
Take advantage of this efficient approach on your own temperature control problems. The experience of the nationwide Johnson organization is at your disposal without obligation. JOHNSON SERVICE COMPANY, Milwaukee 2, Wisconsin. Direct Branch Offices in Principal Cities.

Scruggs-Vandervoort-Barney, Inc., a leading St. Louis department store. Completely air conditioned, this modern store has all-year comfort control by Johnson.

"Johnson Control, a super-brain that no number of men could equal, keeps our temperatures uniform from the basement to the 8th floor," says Coy C. Leach, the store's Chief Engineer. "The system is unusually efficient, and there is a minimum of maintenance. Fuel savings are impressive, too."



Over 150 thermostats, 60 humidostats, 750 valves, and nearly 1,000 other items of Johnson apparatus operate as one efficient control system—and it's all automatic! From this panel in the machine room, 4 zone-control switches position all thermostats throughout the store for heating, cooling or ventilation.



Mr. Leo S. Weil and Mr. Walter B. Moses, mechanical engineers, New Orleans, La., were successful in using a minimum of valuable floor space throughout the store in planning this installation nearly 40 years after the store was built. Sodemann Heat and Power Co., St. Louis, Mo., were the mechanical contractors.

YOU, TOO, may be interested in a store, hotel, hospital, school, factory or office building. Let a nearby JOHNSON engineer help you solve your control problems on any new or existing building, regardless of size.

JOHNSON *Automatic Temperature and Air Conditioning* **CONTROL**

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